Issued Weekly by the
Hill Publishing Company
JOHN A. HILL, Pres. and Treas. ROB'T MCKEAN, Sec'y.
505 Pearl St., New York.
6 Bouverie St., London, E. C.
Unter den Linden 71, Berlin.

Subscriptions payable in advance, $5.00 a year for 52 numbers, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii, or the Philippines, $6.50 in Canada.

To foreign countries, including postage, $8.00 or its equivalent, 33 shillings: 33 marks: or 40 francs.

Notice to discontinue should be written to the New York Office in every instance.

Advertising copy should reach New York Office by Thursday of week before date of issue.

Entered at New York Post Office as mail matter of the second class.

Cable Address, Engminjour, N. Y.

CIRCULATION STATEMENT

Of this issue 9300 copies are printed.

None sent free regularly, no returns from news companies, no back numbers. Figures are live, net circulation.

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The Engineering and Mining Journal

Vol. 93. JANUARY 27, 1912. No. 4.

The Proposed Steel Tariff

The new tariff bill, to be introduced next week in the House of Representatives at Washington, proposes to make important reductions in the duties levied on iron and steel. It meets Mr. Carnegie's doleful predictions as to approaching scarcity of raw material by putting iron ore on the free list, thus at once reducing the cost of Cuban iron ores by 12c. and of all other foreign ores by 15c. a ton; removing the barriers to that extent from the use by our furnaces of the supplies of ore from Newfoundland, Venezuela and Brazil, which are accessible to them. On pig iron the duty is to be cut to 10 per cent.; on rails to 10 per cent.; on most rolled-steel products to about 15, and the more advanced steel products to about 20 per cent.

It is hardly of advantage to go yet into a discussion of the detailed schedules of a bill which is still in the formative stage, and in which material changes may be made before it reaches or even approaches the stage of enactment. The most that can be said is that it proposes a material reduction of duties on the whole iron and steel schedule. The reduced duties, however, appear in most cases to be equal, or more than equal, to the differences between our own current quotations and those that have lately reached us from the British and German markets.

One feature of the proposed bill is that all the duties are plain *ad valorem* charges; there is none of the confusing mixture of specific and *ad valorem* duties which make the present steel schedules complicated and hard to understand. It is to be hoped that some simple plan will be adhered to, whatever changes may be made in the bill. It does not appear likely that the new schedules, if they become law, would induce any great increase in imports, though they might serve as a check on the advance of home prices.

As to the prospects of the bill, it appears altogether probable that it will pass the House of Representatives with few or no important modifications. In the Senate and with the President it will meet with different conditions, and it is not easy to make any forecast as to the result.

American Institute of Mining Engineers

The meeting of the Institute that is to be held in New York next month will doubtless prove to be of great importance in its history. It is the annual meeting and to be decided at it are some radical constitutional changes, among these being the proposals to alter the name of the organization to "American Institute of Mining and Metallurgy," to classify the members by introducing the new grade of "junior members," and to raise the dues of corporate members, i.e., the great body, to $15 per annum, plus $5 extra for those residing within 50 miles of New York.

Certain of these proposals have drawn out expressions of widely differing opinion, especially the matter of dues, and there promises to be some warm discussion at the meeting, which is likely to be no merely perfunctory affair. The election of officers for 1912 is also to take place at this meeting.

The council of the Institute and the committee of arrangements are planning to make the forthcoming meeting a noteworthy event in other respects. It is hoped that it will inspire a reawakening of the old spirit that made the Institute great and will rejuvenate its usefulness, for which President Kirchhoff has been loyally and efficiently working during the last year. The Institute has a grand history and a valuable tradition, but in order that it may live up to them there must be a general participation in its affairs by its members. The first step toward such a participation will be a large attendance at the forthcoming meeting,

and the next will be a frank discussion of the affairs of the organization. It is to be hoped that both may be witnessed next month.

Porcupine

The recent relinquishment of an option by a Porcupine company and the closing down of another property in the same camp, are not surprising, and may be taken to mark a certain period in the history of the camp. A year ago, Porcupine was unquestionably in the limelight. While it is true that some exploration had been done there previous to that time, it is also true that the camp did not receive the general attention of mining men until the winter of 1910-1911. The spectacular showings in evidence then at many widespread points resulted in the raising of property prices to an unwarranted level and with an accompanying time limit for exploration work which was unjust to both buyer and seller and entirely out of keeping with the conditions of work imposed by nature and the general inaccessibility of the region. A direct result of this was the impossibility of making as thorough examinations as most engineers desired. The indirect result was that properties were hurriedly acquired and companies organized and financed overnight.

Developments have now reached a point where many of the first options on properties are expiring. It is probable that many of these will not be renewed. Further, it is likely that many companies have expended the funds originally raised for exploration, and now face new financing. While it is probable that some mines will be developed, it is certain that there will be many disappointments. For its own good, it is to be hoped that Porcupine will rapidly come into its own—a period of sound, rational development.

Mining Dividends in 1911

The year 1911 was not looked upon as a prosperous one by many persons, yet an examination of mining-dividend statistics in the United States seems to show a better state of affairs than would be assumed from current conversations. Excluding certain semi-industrials, such as the great smelting companies, an examination of the mining companies of the United States which keep the public informed concerning their dividend payments reveals the following: Sixty-four leading mining companies paid dividends in 1910 and 1911, in the former year $50,887,261; in the latter, $52,601,858. There were 27 mining companies reporting to the JOURNAL which paid no dividends in 1910, but in 1911 paid $3,502,474. There are 23 companies reporting to the JOURNAL which paid $1,711,928 in 1910, and nothing in 1911.

As to arguments to be deduced from these figures, it would be impossible to draw absolute conclusions without knowing how much of each of these amounts was drawn from previously earned surpluses, and how much money was carried forward in each of the years under discussion to profit and loss by the companies concerned. Without going so far as this, however, and arguing only from the law of averages, we would say that the dividend figures showed a healthy state for the mining industry, and that if fault is to be found with conditions here, it is not with the operating mines and their results, but with lack of capital for financing new ventures, or perhaps that the net dividend growth does not keep proportionate pace with the growth of the population of the country.

Chispas Cyanide Plant, Sonora

The description of the Chispas mill in this issue of the JOURNAL is worthy of consideration, despite the fact that it refers to a plant of comparatively small capacity. On the whole, this mill embodies many of the features of modern practice and shows that local conditions were carefully considered in its design. The cyanide mill is called upon to treat the current and accumulated tailings from the concentrating plant, the ore being crushed by stamps in the latter mill. Because certain metals, subsequently removed by concentration, are cyanicides, the crushing is done in water, which departs from the present trend and recalls that in the younger days of cyaniding, this was the rule, although crushing in solution had its advocates in the early nineties.

In this connection it is interesting to note that crushing in solution was not introduced on the Rand until 1906, although it had been largely used previously in the United States, Mexico and Australia. Improved apparatus and better methods of handling pulp are largely responsible for the change, the older procedure only being necessary in special instances. Machinery improvements have likewise eliminated some of the disadvantages formerly urged against crushing in water. Dewatering devices provide simple and efficient means of preventing too great a dilution of the cyanide solution when finally applied, and with modern agitating equipment, unless the ore is highly refractory, no great loss by poorer extraction need result by postponing the addition of cyanide solution until after the removal of the cyanicides.

Since the Chispas slime is of a crystalline character comparatively free from clayey material, the type of filter chosen should give good results. The method for insuring quick filling of the filter with either pulp or wash solution is worthy of note. As in most of the new mills, zinc-dust precipitation is used. Two forms of zinc-dust feeder are being tried which should furnish some interesting data concerning this important part of the precipitation process.

In a recent number we noted the completion of railroad communication between important ore deposits in Texas and a shipping port on the coast. This week we note that two more supplies of iron ore have been opened to merchant furnaces in the East. One of the Cuban mining companies has offered ore in the open market, which is the first ore from that country which has not been taken by the large steel companies that control most of the mines. A more important incident is the offering of the first ore from the Imataca iron mines in Venezuela. This ore is of high grade, and from all accounts the deposit is very large and the mines capable of great expansion and development.

The testimony of James J. Farrell, president of the Steel Corporation, before the Stanley Committee, does not seem to have increased the fund of information much more than that of Mr. Carnegie. It was largely a statement of individual opinion rather than of any new or illuminating facts. The main point of interest, perhaps, is in noting how Mr. Farrell, as active and responsible head of the corporation, differs from Mr. Carnegie, whose interest in the steel business has for years been merely academic. The difference is very much that between the actor and the spectator.

By The Way

That protean genius, alternately Cassandra and Gentle Shepherd of Woolly Lambs, the considerably well known Mr. Thomas Lawson, of Bawson, has not hesitated to look into the future of financial possibility, remarks the *Evening Sun.* It is unnecessary for us to report via the *Sun* what he saw.

To the common expression, "Nothing is certain except death and taxes," there might well be added, "and suits against the Anaconda company." The most recent one has just been instituted by G. J. Kohl to prove title to a one-third interest in the May claim, from which it is asserted that $3,000,000 worth of ore has been extracted.

Manager Robbins' long-looked for report on the Hollinger mine was to have been out "yesterday," says the *Montreal Star* of Jan. 16, but will be held back until the Messrs. Timmins and the other directors go to Porcupine to receive it. They leave Montreal on Thursday night, Jan. 16. The date of this writing is Jan. 23, and echo answers "when?"

The Greene-Cananea dividend of 25c. per share, payable Mar. 1, 1912, will be most welcome to the shareholders who have been holding on during the long period of fasting. It has been a long trip across the desert, and though numerous waterholes were encountered, the stockholders have at last reached an oasis where a more substantial diet is offered.

John Ferrell, a rescue worker of the Bureau of Mines, was killed, on Jan. 19, while exploring a mine in which a fire was raging at Cherry Valley, Penn. The conditions in the mine, says a Washington dispatch, have so far made it impossible to recover Ferrell's body. It is stated that at the mine disaster at Briceville, Tenn., a few weeks ago, Ferrell rescued five men. A later dispatch announces the finding of Ferrel's body two miles from the entrance to the mine. He left a widow and a son.

A San Francisco dispatch states that "Clarence Mackay, of New York, is planning to raise an endowment fund of $1,000,000 for the University of Nevada. It is proposed to raise the sum by subscription among the heirs of John W. Mackay, James Flood, James Fair, James O'Brien and others who dug wealth from the Comstock mines in the early days. Clarence Mackay and Ogden Mills, son of the late D. O. Mills, are to confer regarding the endowment fund in New York soon. Among those who will aid the plan are Mrs. William K. Vanderbilt, Jr., formerly Virginia Fair, and James Flood, of San Francisco."

Another "chicken-crop" gold rush has been precipitated in Manitoba according to a dispatch from Winnipeg. After finding gold in the crops of fowls killed near Minitonas, the stores of the town are reported to have been closed while their proprietors joined in the rush, and over 600 claims are stated to have been staked. Those states that are endeavoring to stir up a revival of mining should get "hep" to this idea and start a poultry farm. Each prospector might then be supplied with a Brown Leghorn with whom he can discuss geological and attrition problems. Suggestion respectfully referred to the Denver Chamber of Commerce and the Grubstake Committee.

In his annual report, Robert S. Sharp, chief inspector of the Post Office Department makes the following interesting disclosures: "The work of the last year has uncovered a condition among the swindling class which shows the astounding extent of their operations and the enormous amount of their ill-gotten gains. As shown elsewhere, only the few swindling promoters who were arrested last year obtained approximately $77,000,000. * * * * The policy of the Department in attempting first to crush out the strong and powerful criminals who have grown rich at the game has proved exceedingly effective in eliminating the smaller ones." During the fiscal year, 522 individuals were indicted on charges of using the mails to defraud, 196 persons were tried and 184 were convicted. It is interesting to note that in grouping the schemes under which these convictions were obtained the inspector places first in the list: "The promotion and sale of worthless mining or other stocks." It would be still more interesting to know what proportion of those $77,000,000 is traceable to mining frauds.

Up in the Lake Superior gold country, it appears that a lot of simple people are wasting their time digging out of the earth iron ore that is worth only a few dollars per ton, while from statements in the Duluth *Herald,* we note that it is claimed that one of the shafts on the Vermilion range has rock at the bottom that "assays over $210 in gold per ton." To quote further: "More than 150 assays of this rock hitherto made by various assayers have shown an average of $22 a ton in gold and $7 in silver. This ore is being stockpiled. The shaft to reach the iron orebody is being sunk through the gold and silver ore. . . . . The directors and officers of the company were reelected." What in the name of Midas are the shareholders doing? Have they been holding the sack so long that they have acquired the habit? Think of stockpiling $29 ore, while your hard-earned dollars are being poured forth to sink an expensive shaft to encounter a $4 or $5 orebody that you haven't yet seen, and of which you have only had a sort of whiff or *soupçon,* or whatever it is that these French chefs put in their highly flavored soups. To be sure the United States Steel Corporation stupidly continues to devote its entire attention to iron ore, but then it is able to raise some, whereas the company in question is only sinking to encounter the iron formation and engaging in various other commercial enterprises, while it is reported to have $29 ore lying around idle and going to stockpile. Moreover, this is a small and, one might think, mobile corporation, while the Steel Corporation, though it has a fairly competent and experienced department of exploration, has the disadvantage of the complex and cumbersome machinery of a "trust" and presumably will not be able to change its iron-mining policy until after the next annual meeting. But it does seem as though some enterprising Porcupiner might go up and "develop" the Lake Superior gold field.

Besides electing John P. White, of Iowa, as president of the United Mine Workers of America, the annual convention in Indianapolis last week voted to reject a resolution committing the organization to the Socialist party by a vote of 515 to 155. It approved, however, the substitute measure of the resolutions committee declaring "it would be well if the workers would unite on the political as well as the industrial field." This, it appears, was merely an entering wedge of the socialist element to secure later the amendment to permit the organization to indorse a political party. During the same week, the British coal miners were voting on a resolution to strike if the demand for a fixed minimum wage were not granted on Mar. 1, 445,801 voting in favor of a strike and 115,921 against. A struggle beginning Apr. 1 between the coal miners and operators in this country is quite within the range of possibilities.

The craze for free assay stations, to be conducted by the government, the duty of which will be "to analyze or assay rocks or mineral-bearing substances sent to them, and to furnish, at a nominal charge, a complete statement of the results to the one sending the same," recalls to our mind the experience of a certain Western mining school which, under its annual appropriation from the state, was required to do this. An enterprising, but unprincipled, assayer of the state advertised that he would make assays and render bills according to a certain schedule of charges. The data of his schedule need not here be repeated. It is sufficient to mention that they were materially below the commonly charged rates. The enterprising, but unprincipled, assayer sent the samples to the state mining school, where they were done for him for nothing, or perhaps at a nominal charge. The enterprising, but unprincipled, assayer rendered his own bills at the rate advertised. Our memory does not enable us to state how this scandal was checked.

The Canadian Mining Institute

Notice is given that the fourteenth annual general meeting will be held at Ottawa, March 6, 7 and 8. Headquarters will be at the New Russell House.

The provisional program of papers for this meeting is as follows:

"The Gold Fields of Nova Scotia," by T. A. Rickard, London, England.

"The Domes of Nova Scotia," by T. A. Rickard, London, England.

"The Occurrence and Mining of Platinum in the Urals," by Dr. A. L. Simon, London, England.

"Mining in Russia" (illustrated by lantern slides), by Dr. A. L. Simon.

(Title to be announced.) J. D. Kendall, London.

(Title to be announced.) J. Parke Channing, New York.

"Monel Metal," by Dr. W. Campbell, New York.

"Recent Improvements and Additions at the Canadian Copper Company's Works, Copper Cliff, Ont.," by David H. Browne, Copper Cliff, Ont.

"The Evans-Stansfield Electric Furnace" (with practical demonstrations), by J. W. Evans, Belleville, Ont.

"Concentration of Silver Ores, with Special Reference to those of the Cobalt District," by Prof. Robt. H. Richards, Boston, Mass.

"Concentration of Silver-Lead Ores in British Columbia," by S. S. Fowler, Nelson, B. C.

"The Decrease in Value of Ore Shoots with Depth," by F. L. Garrison, Philadelphia.

"Artificial Ventilation in Metal Mines," by Frank C. Loring, Toronto.

"The Origin of the Quartz Veins of the Cobalt District," by Dr. A. E. Barlow, Montreal.

"The Development of Fine Grinding in the Treatment of Gold Ores," by Henry Hanson, Porcupine, Ont.

"Methods of Sampling in the Porcupine District," by G. C. Bateman, Porcupine, Ont.

"Economic Geology of the Porcupine District," by A. G. Burrows, Toronto, Ont.

"The Evolution of the Mining and Milling of Asbestos," by John J. Penhale, Sherbrooke, Quebec.

"The Ore and Coal-bearing Formations of the Yukon," by D. D. Cairnes, Ottawa.

"The Copper Mine Country" (illustrated by lantern slides), by J. B. Tyrrell, Toronto.

"The Fallacy of the Anticlinal Theory of Petroleum Deposits," by Eugene Coste, Toronto.

"The Occurrence of Manganese at New Ross in Nova Scotia," by H. E. Kramm, Ithaca, N. Y.

"Glaciation, and its Effect on Mineral Veins" (illustrated by lantern slides), by J. B. Tyrrell, Toronto,

"The Coal-bearing Formation of the Nanaimo District, B. C.," by C. H. Clapp, Ottawa.

"Pitching Coal Seams," by Alexander Sharp, Vancouver, B. C.

"The Development of a Coal Prospect," by Wm. Hutchison, Hillcrest, Alberta.

"International Coal Competition," by Allan Greenwell, London.

"A New Departure in Mining Education," by H. G. Carmichael, Sudbury, Ont.

"Safety Appliances for Prevention of Accidents in Mines," by Dr. W. H. Tolman, New York.

(Title to be announced.) Frederic Keffer, Greenwood, B. C.

"Some Geological Principles Relating to Iron Ore Exploration," by Dr. C. K. Leith, Madison, Wis.

"The Pilgrims of Early Mining on the Columbia River, British Columbia," by Frank L. Nason, West Haven, Conn.

"Company Law," by J. M. Clark, K. C., Toronto.

Other papers have also been promised, the titles of which will be announced later.

Spelter Production of the World

The world's production of spelter is estimated by Messrs. Henry R. Merton & Co., of London, as in the accompanying table. These estimates have been sent out by the Merton house for a number of years, and are generally very close to the later official figures, long familiarity with the trade having enabled them to attain remarkable accuracy. The figures are in long tons, of 2240 lb. each.

WORLD'S PRODUCTION OF SPELTER

	1909	1910	1911
Belgium	164,470	169,860	192,020
Holland	19,240	20,645	22,375
Germany, East	137,490	138,040	153,715
Germany, West	79,125	86,120	92,735
Great Britain	58,415	62,085	65,900
France and Spain	55,235	58,210	63,210
Austria and Italy	12,440	13,095	13,705
Poland	7,820	8,495	9,500
Total Europe	534,235	556,550	613,160
Australia	.....	500	1,000
United States	236,660	246,680	263,260
Total, long tons	770,895	803,730	877,420
Total, metric tons	783,229	816,690	891,459

The total increase in 1911 over 1910 was 73,690 tons, or 9.2 per cent.; over 1909 it was 106,525 tons, or 13.8 per cent. In 1911 all the producing countries showed increases over the previous year, the larger gains being in Belgium, Germany and the United States. Since 1902 the gain in zinc production has been nearly continuous, 1908 having been the only year showing a smaller production than the preceding one. The increase in 1911 over 1902 was 340,660 tons, or 63.5 per cent. The demand for zinc seems to have kept pace fully with the production. The average price in London for 1911 was the highest in 10 years, with one exception, 1906. This average price, which was £22 3s. per ton in 1909, increased to £23 in 1910, and to £25 3s. 2d. last year.

New Alaskan Placer Law Proposed

WASHINGTON CORRESPONDENCE

Delegate Wickersham has offered a bill to modify and amend the mining laws in their application to the territory of Alaska. The main provision of the bill is as follows:

That no association placer-mining claim shall hereafter be located in Alaska in excess of 40 acres, and on every placer-mining claim hereafter located in Alaska, until a patent has been issued, not less than $100 worth of labor shall be performed or improvements made during each year, including the year of location, for each 20 acres or fraction thereof. . . .

That no person shall hereafter locate any placer-mining claim in Alaska as attorney for another unless he is duly authorized by a written power of attorney, duly acknowledged and recorded in any recorder's office in the judicial division where the location is made. Any person so authorized may locate placer-mining claims under such power of attorney for not more than two principals or associations, but no such agent or attorney shall be permitted to locate more than two placer-mining claims for any one principal or association during any calendar month, and no placer-mining claim shall hereafter be located in Alaska except under the provisions of this act. No person shall hereafter locate, or cause to be located, for himself more than two placer-mining claims in any calendar month: Provided, that one or both of such locations may be included in an association claim.

Whale Oil for Dynamite Glycerin

The setback which the South African explosives' industry recently received at the hands of the inspector of explosives of the Union government has at last been removed, states the *Mining Journal*. It is reported that the government chemist has proved, or has admitted that the local whale oil contains nothing which would render it unsuitable for the manufacture of dynamite glycerin. The glycerin plant of Messrs. Kynoch, Ltd., at Durban, had to be closed down in consequence of the refusal of the government to sanction the use of glycerin made from whale oil. In connection with the whaling industry it is rumored that it is the intention of the Union government to enforce a five years' close season for whale fishing.

Correspondence and Discussion

Views, Suggestions and Experiences of Readers

Research Work in Technical Schools

Under the title of "Coöperation in Research Work," several articles have recently been published in the JOURNAL in which the subject of research work in technical educational institutions have been discussed. These and a pamphlet on "The Futility of Technical Schools," recently distributed by the late R. T. Crane, offer an opportunity to comment on the systems of education now in vogue at most American technical training institutions.

Mr. Crane undoubtedly was over-bitter in his denunciation of such schools. I believe it is the general consensus of opinion that the systems of training engineers can be greatly improved, but that they do not deserve the stigma that Mr. Crane would cast upon them. He offered no explanation of why the systems are unsatisfactory, or it might better be said, inefficient. He suggests no better way of training an engineer than making him serve a long apprenticeship in shops, or mines where it must be acknowledged those who are in a position to teach are too busy to do so.

The function of the technical school is to teach the students the fundamentals of their professions. Certainly that is not the function of large industrial institutions. One would naturally suppose that if the schools fail in their purpose that there is something in the educational system that needs correction. Mr. Crane's chief complaint seemed to be that few graduates of a technical school were fit to step in and fill a position. In no branch of their profession had they become proficient enough to take up some line of work without at first undergoing a period of apprenticeship under their first employer.

The first position that a graduate of a mining school is most apt to find is that of surveyor or assayer. Knowing this then, why should not the schools equip their graduates with enough training in either or both these branches so that they could take such positions upon graduation with at least a small fund of experience? The young engineer, well trained as a surveyor or assayer, could then fill his position with more satisfaction to his employer. I do not mean that the schools should produce only surveyors and assayers, but that they should give the students sufficient training in these branches to enable them to make a living. It is while holding such positions that most young engineers are brought first in contact with the work they have chosen to make their life profession. Their technical training should enable them to learn enough by observation to fill minor positions that would bring them in closer contact with the other branches of work such as the actual operations of mining, drilling or running a blast furnace, as the case may be.

In one of our mining schools of high rank the course in surveying is excellent and just falls short of equipping its students to fill a position as mine surveyor. On the other hand, the course in assaying is a waste of time to the average student. This course comprises making 30 or 40 determinations of silver and gold by fire assay, a few determinations of tin, and a smattering of other work such as mint methods. The students make assays in duplicate of one sample at a time and half a dozen men use the same furnace. The course drags through a half year, laboratory work being done only on alternate weeks. At the end of the course the student makes determinations on ten different samples of ore, all run at the same time.

Such a course gives the student a fair idea of the principles of the methods used and the variations that must be made in assaying ores, but it does not equip him with any facility in manipulation, the importance of which receives little attention from his instructors. Such a student will naturally be overwhelmed if his first job consists in running 30 or 50 samples in triplicate the first day he goes to work.

To properly train a student in assaying he should receive personal instruction at the start, and at once be taught the ways of assaying as he will find them in a mine or smeltery assay office. It is this lack of personal instruction that makes most college assaying courses futile. The student certainly does not receive the training he should, and the reason often is that the instructors and teachers are too much absorbed in research work to devote the time necessary for the proper amount of personal instruction to each individual. Many of the instructors value their position chiefly because of the opportunities it creates for research work.

It is my contention that if efficiently prepared men for the engineering professions are to be graduated from the technical schools, the business of the professors and instructors should be to teach the students the fundamentals of mining and give them special training in one subject so that they are competent to hold a position in that line. If attention be devoted to such instruction there will be little time for research work. Such work could be delegated with advantage to the students, to post-graduate courses only, or better yet, to a special department, the teachers confining themselves to teaching the students and not dividing their attention between teaching and research work.

The average student from such an institution would be better equipped to serve his first employer and would, I believe, stand better chances of rapid promotion and increasing responsibility than one who had received as little personal instruction as is now given in some of the technical schools.

AN ASSAYER.

New York, Jan. 21, 1912.

Government Aid to Mining

The editorial, "Government Aid to Mining," in the JOURNAL of Jan. 13, 1912, I have read with interest, as it voices the opinions of the real mining men of Colorado.

There is, and has been in existence for many years at Denver, a testing plant, one of the most complete of its kind in the world, and, from my own experience, I can say that in it can be determined the proper methods of treatment of 99% of the ores of Colorado and the West. This plant is owned and maintained by Henry E. Wood, one of our reliable pioneer assayers and metallurgists.

The State School of Mines, at Golden, about 15 miles from Denver, has built and is equipping a modern steel and concrete building with facilities for making tests of all the most approved methods of ore treatment; original research is carried on continuously and the students are drilled in this work in the school course.

Now, if our "practical" men wish work done, they can do it here, but it costs money, and I think that they are trying to get something for nothing. Denver is the permanent home of more processes of ore treatment than any other place I know. Some of the processes that have been tested are "rotten," others have a ray of merit, and the best are those about which the least is said. They are being worked out by men trained in the science of metallurgy.

The trouble with Denver is that it is inflicted with some sensational newspapers and men that are ready to attack anything that they think will bring grist to their mill. This spirit has become, in

a measure, epidemic here for the time being. For instance, one red-page sheet made some time ago a vicious attack on our State School of Mines; one of the greatest institutions of its kind in the world. The paper has a large circulation, as it feeds a "frenzied food" relished in this highly nervous climate—consequence—the School of Mines had an entrance of only 35 students in September, 1911. There could be written pages of such instances. The real mining men of Colorado are not crying for free this or that pabulum, but are still grinding away and working out their own particular problems.

J. A. SNEDAKER.

Denver, Colo., Jan. 19, 1912.

Gold Discoveries on the Rand

It is a little more than a year ago that the discovery of gold ore in a drill hole that was sunk on the Cyferfontein farm on the Rand occasioned much discussion as to whether or not the Main Reef Series extended that far to the southwest from the hitherto known gold-bearing area. Many arguments for and against accepting this discovery as indicating the presence of the series were aired, based mostly upon geological facts or conceptions. Many claims were staked and several companies were organized to carry on development work to determine at once if a gold-bearing member of the series did exist at the place and if it could be profitably worked.

Recently several of these companies passed out of existence without having found anything of value as a return for the money spent on exploration work. More drill holes were sunk during the year 1911, one of which was started close to the one from which the gold ore had been taken, but none of these holes intersected gold-bearing conglomerate. A shaft was sunk, which, it was calculated, would intersect the ore at a shallow depth, but after passing a considerable distance below the calculated depth no ore was found, and crosscuts driven into the country failed to reassure those who had placed so much upon the discovery of gold in one drill hole.

At the present time there is more excitement evident over the recent discoveries of high-grade ore in the vicinity of Witpoortje on the North Rand than was observable a year ago when the Cyferfontein find was first reported. The ore found at Witpoortje and Roodepoort is reported to assay as high as 58 oz. gold on the outcrop, and one prospector has already cleaned up a small fortune by hand crushing the surface ore while building up at the same time a dump of $7 ore. The vein seems to be workable over a width of 12 inches.

De Launay obtained samples of ore from this same vicinity which he, in his "Les Mines du Transvaal," states assayed from 20 to 120 oz. per ton, but that the vein from which they were taken petered out at a depth of about 60 ft. These veins or those in the same vicinity, but belonging to a lower horizon were prospected by the Comte de Waru, but without his coming to any conclusion, except that the rich veins were associated with a zone of dislocation, but it was never settled whether the gold existed by virtue of the proximity of the veins to fissures or whether the rich ore was characteristic of the upper portion of the sandstones and conglomerates, as is the case in the Witwatersrand formation. The failure of the Comte de Waru is principally responsible for the neglect of continuing work along the North Rand.

Whether these discoveries are of any value, of course, remains to be seen. Exploration may fail to show any workable extent of profitable ore, but it can be said that from what was previously known of the North Rand, the companies now forming to do exploratory work have a better grounded hope for success than characterized the similar flotations for work at Cyferfontein a year ago.

PROSPECTOR.

Johannesburg, Transvaal, Dec. 6, 1911.

Taxation of Mineral Rights in Michigan

In the JOURNAL of Jan. 13, 1912, P. B. McDonald made a statement in reference to taxes at Ishpeming which is misleading. It has been stated that the Oliver Iron Mining Co.'s taxes were 40c. per ton on ore shipped last season, the Cleveland-Cliffs Iron Co., 26c. and the Jones & Laughlin, which is the Lake Angeline mine, 5c. per ton. I do not know how much per ton the Oliver and Cleveland-Cliffs companies are assessed on their ores in the mines, but I do know that the Lake Angeline is assessed over $1 per ton for all available ore in the property.

The Lake Angeline is working 3 eight-hour shifts and mining all the ore that it is possible to get out from this mine, whereas, the Oliver Iron Mining Co., at Ishpeming, is feehold property, working only small forces and then only four days a week. The Cleveland-Cliffs Iron Co. is not a consumer on a large scale, except for ore to be smelted in charcoal furnaces, and this being a dull season for selling ore, the company did not ship what was mined, but carried over large stock-piles. The mines were not worked to full capacity.

To show further the unreliability of Mr. McDonald's information, our tax for Lake Angeline was 7c. per ton on ore shipped. We shipped from the Lake Angeline mine, 167,258 tons, a portion of which was carried over from the previous year, shipping more than we mined; the remainder of 21,387 tons was shipped from the Mitchell mine, which is assessed in Tilden township. This was shipped as Lake Angeline ore, hence the injustice in the statement of computing the variation in taxes.

THOMAS WALTERS,
Agent, Jones & Laughlin Ore Co.

Ishpeming, Mich., Jan. 18, 1912.

President Taft at the Homestake

I note in a paragraph in the "By the Way" columns of the JOURNAL, of Oct. 28, 1911, that the recent visit to the Homestake underground workings was the first occasion of the President having been underground in a gold mine.

In the autumn of 1907, Mr. Taft, then Secretary of War, went through the workings of the Minnesota mine of the Benguet Consolidated company at Baguio, in the Philippine Islands. He then told me, while I was in charge of that property, that it was his first experience underground in a gold mine.

Of course, it would be presumptuous to make any comparison between the Minnesota mine and the great Homestake, which produces more ore daily than the Baguio mine did in a month, but the fact that it was at the time producing gold at a profit entitles it to the designation of a gold mine.

This correction may appear trivial, but as a statement of fact may be worthy of publication, as we engineers in the field have formed the habit of believing implicitly in the statements published in the JOURNAL.

C. M. EYE.

Aroroy, Masbate Island, P. I., Dec. 13, 1911.

[We think that the JOURNAL did not deviate from accuracy when it published the statement that the visit of Mr. Taft to the Homestake was the first time a President of the United States had been underground in a gold mine. It is interesting to learn, however, that while Secretary of War, Mr. Taft was underground in a Philippine gold mine.—EDITOR.]

Where Is Tantalum Found?

I would like to inquire through the columns of the JOURNAL if there exist in the United States, either mines or prospects in which tantalum minerals occur in appreciable quantities. The only records of the production of tantalum minerals that I have been able to find, refer to some work done in an amblygonite mine at Keystone, S. D., which, for a short time, produced a small quantity of tantalum, but which, I understand, is not now being operated.

ENGINEER.

New York, Jan. 23, 1912.

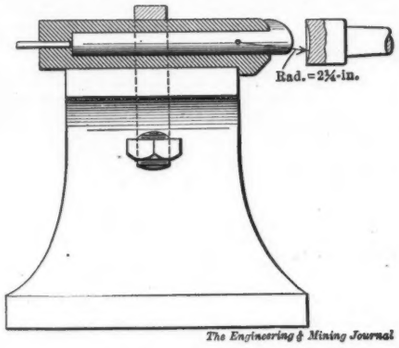
Details of Practical Mining

Accounts of Useful Ways of Doing Many Things in the Day's Work

This department is designed to treat in a brief way of details of everyday practice. Many readers are doing interesting things in mining and milling that other readers like to know about. The thought that there is nothing new in them should not be a deterrent to telling about them. Something that is an old story in one district may be quite unknown in another. Our draftsmen can develop any kind of a pencil sketch that is intelligible. A blueprint answers all the purposes of the engraver. Contributions are solicited.

Forging Anchor Bolts

The bolts for fastening the rails to the shaft stringers in the Mohawk type of concrete-stringer construction can easily be made from ¾-in. rods by the following method: A rod of this size is cut into 14-in. lengths as two inches



DIE AND DOLLY FOR SHAPING ANCHOR BOLTS

of metal is required to make the head of the anchoring bolts. A length of this rod, after being heated at one end in the forge, is put in the form shown in the accompanying sketch, which is bolted to the tail of an anvil by a special clamp that comes over the form and goes through the hardie hole.

In upsetting the head of the bolt a riveter is used which is fitted with a striking piece the end of which is turned to a segment of a sphere having a radius of 2¼ in. so as to form a hook on the end of the bolt that will have a low, round top surface upon which the wheels of the skip will not catch. The angle of the form shapes the under side of the hook so that, when the bolt is in the stringer, the hook will come in immediate contact with the rail throughout its whole under surface. This angle of the form is, of course, obtained by adding to 45°, the angle that the anchoring bolts make with the upper surface of the stringer, the angle of the flange of the rail that is used on the skip tracks.

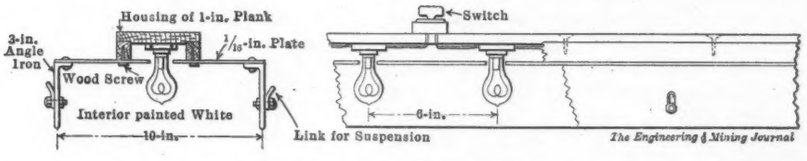
Sometimes the bolts after they are formed stick in the form. A small pin is, therefore, inserted in the bottom so that the bolt can be driven out by a light tap of a hammer as soon as it is finished. The striking piece on the riveter heats quickly owing to the speed at which the bolts are made, so a stream of water is kept playing on it. The threads, of course, are put on the anchoring bolts after the hook has been formed.

Lighting Trough for Drafting Tables

By W. R. HODGE*

The system of lighting the drafting tables of the mechanical department at the Michigan College of Mines practically obviates the bothersome shadows which come with the turning on of the incandescent lights on winter afternoons.

Above each range of tables is suspended an inverted trough, the details



ILLUMINATOR FOR DRAFTING ROOM

of which are shown in the accompanying sketch. The inside of the trough is painted white and contains tungsten lamps of four candle-power each. These lamps are set on six-inch centers and are connected in parallel. A switch controls the lamps of the individual tables.

The trough itself is made of 3-in. angle iron and 1/16 in. plate. One of the legs of the angle is shortened to decrease the weight of the trough. The angles are riveted to the plate which is 10 in. wide and extends the full length of the tables. This plate is pierced at six-inch intervals with holes sufficiently large to admit the shanks of the lamps used. Fastened above and directly to the metal part of the trough by wood-screws is a wooden housing of one-inch plank which contains the lamp sockets and wiring. Trough and housing are suspended from the ceiling by chains fastened to the angle-iron sides.

*Mining engineer, 134 College Ave., Houghton, Mich.

Electric Hoist for Shaft Sinking

Small electric hoists are now coming into use on the Rand for hoisting while a shaft is being sunk. The conditions during shaft sinking are such that it is not desirable to install and use the permanent hoisting equipment. An example of this practice is that of the central shaft of the Cinderella Consolidated mine at Boksburg, which is being sunk to a depth of 3000 ft. and will be 43 ft. 6 in. long by 7 ft. 6 in. wide, with six hoisting compartments and one pipe and ladder way.

The shaft was sunk to a depth of 10 or 12 ft. by using portable steam cranes; then the collar set was placed and the permanent headframe erected, but with four light sheaves over four of these compartments. Two double-drum electric hoists were then erected in a temporary building. Each hoist is equipped with two drums 8 ft. diameter by 2 ft. 3 in. face, with a capacity for 3000 ft. of 1-in. rope. There are hand-operated post brakes on each drum, and a foot-operated band brake on the first-motion shaft. The gearing is double reduction. The total load is 10,000 lb., as follows: Skip, 2500; rope, 4500, and rock, 3000 lb. The hoisting speed is 1000 ft. per min. Each hoist is driven through an elastic coupling by a 180-hp., three-phase, 50-cycle 500-volt, Westinghouse-type slip-ring induction motor, capable of carrying a load of 450 hp. for short periods. The control of the hoist is effected by standard Westinghouse liquid controllers. By means of these controllers the hoists are stopped, started and reversed at any speed from zero to full speed in either direction.

A power-storage set is provided to insure safety in case the line power

should fail at the time when the shots in the bottom of the shaft are to be fired. This power-storage set consists of an exciter, a synchronous motor which may act as a generator, a heavy flywheel running in heavy bearings with forced lubrication, and a starting motor for bringing the synchronous motor up to full speed. The synchronous motor is connected directly to the power line, and automatic devices are arranged so that a failure of the power supply causes the main circuit to be interrupted. The power for driving the hoist is then derived from the flywheel until power supply is restored. In this case the generator is of 150 kw. capacity, running at 750 r.p.m., and the flywheel in slowing to 375 r.p.m. gives out sufficient energy to run the set light for five minutes and then hoist a load of 700 lb. in the skip through a distance of 400 ft. This power-storage set, according to the *South African Mining Journal,* is only used at blasting time; that is, seldom for more than half an hour at a time, three times in 24 hours.

When all the holes are drilled in the shaft, the workmen ascend and the blaster loads the holes. About 15 minutes before he is ready to light the fuses, he sends a special signal to start the power-storage set. Another signal is sent as soon as he is ready to fire the holes, whereupon the engine driver raises and lowers the skip about two feet to show that all is right. The blaster then lights the fuses, gives the hoist-away signal, and is carried out of danger whether the power supply from the main line has failed or not. In case of failure of the main power supply the power-storage set keeps the skip rising until the blaster is out of the danger zone.

These interruptions of power are frequent, due, of course, to the great difficulties under which the Victoria Falls & Transvaal Power Co. operates its stations, for there are few places in the world where thunder storms are more violent or frequent than in South Africa. These difficulties will not be experienced to such a degree in other countries.

The cost of power varies, but averages 1.17c. per kilowatt-hour. The cost of the two hoists and flywheel sets delivered in South Africa, but not including erection or cables, was approximately $24,000. Records show that the cost of sinking 148 ft. with a steam sinking hoist was approximately $850 for power under conditions similar to those in which 142 ft. was sunk by the electric hoist at a cost of $260, a saving of about $4 per ft. in power alone. In addition to this it is estimated that there is a further saving of about $5 per ft., due to the delicate control of the electric hoist which enables them to carry out maneuvers impossible with a steam hoist. On this basis the hoists and power-storage sets, according to their advocates, will pay for themselves before the shaft is completed, and even then would possess considerable value at second-hand, as such hoists are by no means worn out in three years. In January, 1911, 142 ft. of shaft was sunk at a cost for electric power for hoisting of $260; in February, 84 ft., at a cost of $149; in March, 75 ft., at a cost of $154; in April, 116 ft., at a cost of $282; and 153 ft., at a cost of $384 in May.

Shaft Station in Inclined Foot Wall Shaft

By Claude T. Rice

At the mines with a flat-dipping vein, in the Michigan copper district, the skips are almost universally loaded by dumping the cars directly into them. Turntables are used for switching the cars, which are made to hold approximately 2½ tons. Generally the shafts are sunk in the vein, and the spur tracks come up to the sides of the shaft; the main track continues through to the other side of the plat, along the hanging wall, and the turntables are placed in front of the shaft on the main track as shown in Fig. 1. The skips generally hold seven tons so that it takes three cars to make a load. Two cars stand ready to be dumped, while a third car is on the main track.

Fig. 2 shows the arrangement of the station at the 31st level of Wolverine No. 4, shaft which is sunk in the foot wall about 25 ft. from the vein. On the south side of the shaft a recess is cut so that two of the cars can be dumped on the side, the third car being dumped from behind; on the north side only one car is dumped from the side turntable and the other two are dumped from behind, the empty car being switched over to the side-dump track to get it out of the way.

On the south side, in the back part of the station, it will be noticed that there is a square corner cut out. This was for the small hoist used in sinking the shaft deeper from that level. When the station is cut in this way a brow of ground is left under the crosscut; to support this a reinforced concrete pillar is put in at the Mohawk mine before the brow has begun to give any trouble, and the floor of the station is laid with reinforced concrete, 6 in. thick, designed to stand a load of 400 lb. per square foot.

Neutralizing Towers at the Ashio Smeltery, Japan

At the Ashio smeltery of the Furukawa Mining Co., in Japan, the copper-furnace gases are passed through four neutralizing towers placed in series on the side of the mountain between the works and the chimney. This works was visited by the American Institute of Mining Engineers on its recent trip, and the towers are described by Prof. J. W. Richards (*Met. and Chem. Eng.*, Jan., 1912), as follows:

The towers are of brick, 12 ft. square by 42 ft. high, down which (through 200 holes of 0.4-in. diameter) lime is showered. The gases average 0.8 per cent. SO_2 and 0.3 per cent. SO_3. By using 40 cu.ft. of water per minute and 300 lb. of burnt lime per hour in the towers, all the SO_3 is intercepted and 40 per cent. of the SO_2, reducing the latter to 0.5 per cent. The water containing much SO_2 in solution is run into settling ponds, more lime there added, and the clear waste water filtered through sand be-

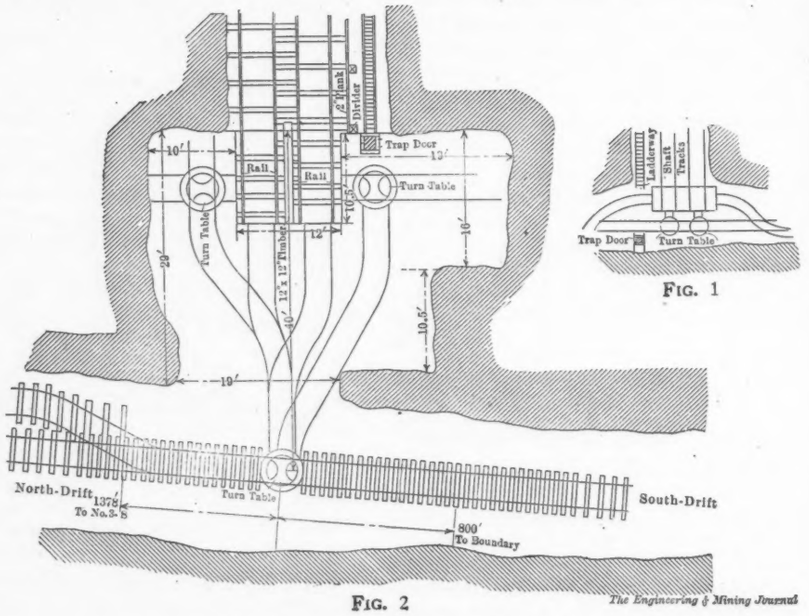


FIG. 1

FIG. 2

SHAFT STATIONS IN INCLINED SHAFTS

fore being discharged into the river. The government evidently considered this a fairly satisfactory solution of the smoke and fume question at this particular smeltery.

A New Design of Undercurrent Grizzly

By F. H. Hazard*

The idea of an undercurrent grizzly with rocking bars was first tried out in one of the hydraulic mines of northern California where much difficulty had previously been experienced in keeping the grizzlies from clogging with pebbles and wedge-shaped slabs of rock from the gravel bank and bedrock. The practicability of such a grizzly for undercurrent sizing was clearly proved, but, in this particular instance, the grizzly was not an entire success on account of poor design and construction.

The clogging of grizzlies has always been a serious problem in undercurrent practice since the bars cannot be cleaned by hand while the mine is in operation. The sluice is in constant service weeks or months at a time and even a partial clogging is the cause of serious loss and greatly lessens the advantage gained by the use of the undercurrent.

The ill effects caused by the presence of clogged material in the spaces between the grizzly bars are twofold:

(1) The space occupied by the clogged material is rendered useless for passing the gold-bearing sands. In order not to rob the sluice of that water necessary to carry the coarse gravel and boulders to the dump, grizzlies must of necessity occupy only a limited length in one of the boxes of the sluice line. It is evident, therefore, that increasing the length of grizzly surface in the sluice, to provide for space lost by any clogging which may take place, is not feasible.

(2) Clogged material on the grizzly bars makes a rough surface on the floor of the sluice box. This roughness not only causes a swirl or eddying movement in the water that raises considerable quantities of the sand from the bottom of the sluice, but also causes a large proportion of the sand to be thrown upward by its impact upon the clogged material. Large quantities of sand are thus lifted by both these means into the upper currents of the sluice stream, the water of which here passes over the bars of the dump. Thus any sand contained in these upper currents is swept over the bars and lost for undercurrent treatment. The heavier black sand, with which the greater proportion of the fine and rusty gold travel, naturally hugs the bottom of the sluice and anything that tends to disturb this condition, particularly at the point where the sand is to be drawn off, will occasion loss. Clogged material on the bars frequently is the cause of mine wash becoming banked at the grizzly and if banking does occur here all the sand coming down the sluice is lost either by being swept over the now totally ineffective grizzly or over the sides of the sluice.

The accompanying description and drawings are of a rocking bar grizzly embodying the main features of the California installation already referred to, but with details of construction modified considerably by me. These modifications, I believe will overcome the principal weak points discovered in the operation of the grizzly.

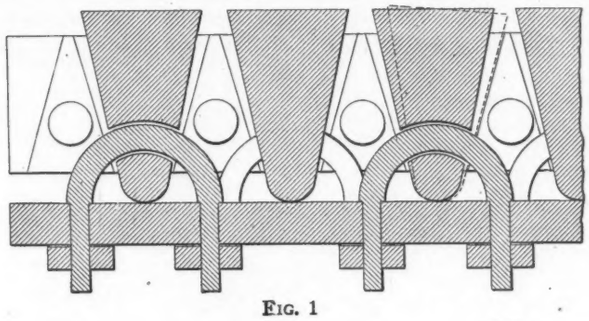


FIG. 1

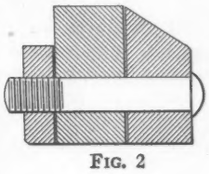


FIG. 2

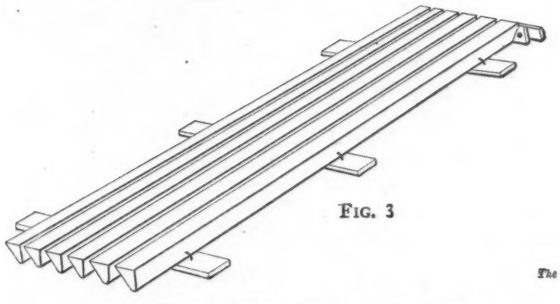


FIG. 3

The Engineering & Mining Journal

A ROCKING BAR UNDERCURRENT GRIZZLY

The undercurrent grizzly as shown consists of a series of parallel steel bars six feet in length, 2¾ in. in depth and 1½ in. wide across the top. In cross-section each bar tapers inward from the top down and at the bottom is rounded to a semicircular shape, as shown in Fig. 1. Through the thin part of the bars holes are drilled to receive U-bolts, the bends of which are semicircular. These bolts hold the bars in place on steel cross plates upon which the bars rest. The diameter of the holes through the bars is slightly larger than the diameter necessary to take the U-bolts in order that the bars will not bind on the bolts but have ample play to rock freely in a sideways direction. The points of contact of the bars on the cross plates act as pivots and each bar may swing sidewise on the arcs of circles of which these pivots are the centers. At the upstream end of the undercurrent a steel bar shown in Fig. 3 is placed crosswise to the grizzly bars and attached to the framework of the sluice box. This bar butts up close to the ends of the grizzly bars. Upon it are bolted lugs as shown in Fig. 1 which extend into the spaces between the grizzly bars for a distance of about an inch. The object of the lugs is to limit the sidewise swing of the grizzly bars. The upstream end of the grizzly is overlapped by the bottom boards of the sluice for several inches to shield these lugs from sand and small pebbles which otherwise might have a tendency to lodge between the lugs and the bars and stop the rocking of the bars.

When the sluice is in operation the grizzly bars receive a sidewise oscillatory motion from the force of the water, gravel and boulders passing over them. This rocking motion does not to any notable degree prevent pebbles and rock slabs from becoming lodged as these materials are constantly filling the spaces between the bars. However the movement of the grizzly bars produces an action similar to that of a shaking screen which keeps the oversize in motion and traveling forward and thus the oversize, although occupying the surface of the screen, is prevented from rendering the screening surface useless.

In its trial at the California property the grizzly proved a great success as a prevention against clogging. It was found that as much sand and water passed to the undercurrent box after several weeks constant operation as passed a few minutes after piping started and the sluice was carrying its normal capacity of mine wash.

Its chief difficulty lay in the fact that it allowed much coarse gravel to pass

*Mining engineer, 1314 Park Road, Washington, D. C.

between the bars and occasionally robbed the sluice of too much water when the openings between two adjoining bars, at full side swing and in opposite directions, became temporarily held stationary by lodged material.

My idea in the construction of this grizzly has been to give a limited sidewise rock to the bars and to make this rocking as free as possible. I believe all that is necessary to produce the results hoped for is a design that will allow a short side rocking movement of the grizzly bars. The effect produced by a grizzly thus constructed, when in operation in the sluice box, will be that of a grizzly composed of rapidly vibrating bars. This constant vibration will wear on any lodged material which, if small pebbles, will soon work them through the spaces between the bars or, if wedge-shaped pieces and slabs of bedrock, will wear them quickly to an extent such that they will become loosened and picked up by the onward rush of the water going to the dump.

I have never heard of a grizzly, constructed along the lines of the one described, being tried for the sizing of ore. However I believe that with bars of suitable cross-section a grizzly of this type could be used to advantage for such work, particularly where mucky and other ores liable to clog are handled. I do not wish to assert that a grizzly so constructed would not clog when used with either dry or mucky ores, but I do believe it would not clog as readily as a grizzly of the ordinary type and it certainly could be more easily and quickly cleaned.

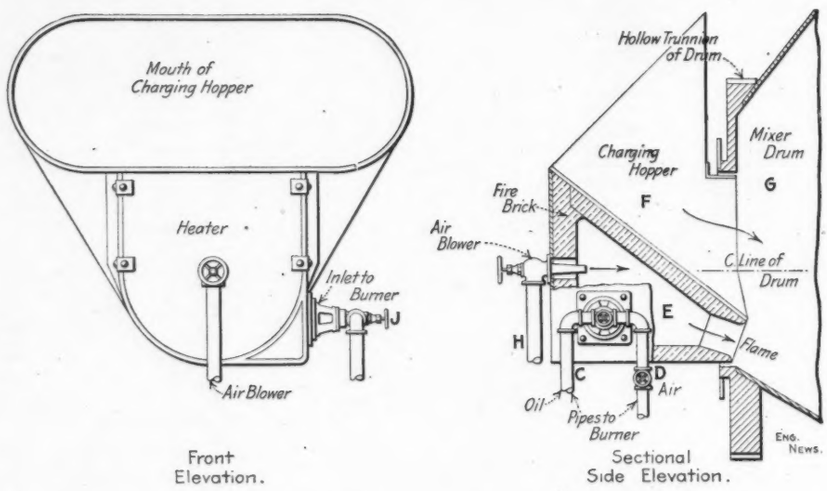
Wire Screens for Stair Treads

In all mills where wire screens are used there is rapidly accumulated a quantity of worn out screens which must be scrapped or some use found for them. If brass- or copper-wire screens are used, the worn out screens may be cleaned, rolled into wads and melted down for casting into bars. These bars can be used in making small copper or brass castings in the shop.

At the Ray Consolidated mill in Arizona, some of the worn out screens are used for covering the stairways. The screens are cut to a size a little larger than the stair tread and the rough edges are folded under. The screen is then tacked in place. The stairways about a mill are apt to be dangerously slippery and the old screens have proven efficacious in obtaining a tread on which the men will not slip. The screen will, of course, accumulate dirt which cannot readily be removed, but this dirt does not interfere with the function of the screen in giving a tread upon which a man can walk with little danger of slipping. The same use of screens can be extended to runways and walks about the mill.

A Heating Attachment for Concrete Mixers

With the extending use of asphaltic and bituminous concrete, mixing machines have been utilized for the preparation of these materials. This necessitates the application of some form of heating system to the mixer drum in order to dry the aggregate and to maintain the necessary temperature for softening and mixing the materials. Such a heating system may be used also in making concrete during cold weather. In some cases, heat has been applied to the exterior of the drum, but the accompanying illustration, from *Engineering News*, Jan. 18, 1912, shows a mixing machine in which the heat is applied to the interior, where it acts directly upon the contents



HEATER ATTACHMENT FOR CONCRETE MIXERS

On the frame of the machine is mounted an air compressor, belted to the main engine (or motor). The air is delivered to the top of a receiver, which forms a tank for both air and oil; the capacity is 48 gal. and the normal supply of oil is 32 gal. The air pressure forces the oil out through a pipe which extends to the bottom of the tank, thus preventing air bubbles in the oil. Two 1¼-in. hose pipes *C* and *D* deliver the oil and air, respectively, to the burner or atomizer of the combustion chamber *E* which is placed beneath the charging hopper *F;* this chamber is a steel box with firebrick lining. The flame from the burner is blown across the chamber, and at the rear of the chamber is an air blower which diverts the flame and drives it forcibly through an opening which registers with the charging opening of the drum *G*. This blower is fed by a small hose pipe *H* which is connected to the main air pipe back of the burner. The combustion chamber is practically a part of the charging hopper, and tilts with the motion of the mixer drum.

The oil and air pipes unite at the burner and the flame is regulated by a single needle valve *J*, so as to obtain the desired intensity of heat. The outlet of the burner is so formed as to give the flame a whirling motion in the chamber so that it does not reflect directly back upon the burner from the opposite wall. The air jet from the blower *H* strikes the firebrick lining of the combustion chamber and is deflected downward to the nozzle opening, causing a sharp current which delivers the flame into the drum. The material in this revolving drum falls through this zone of heat.

When the machine is in use for making paving composition, the rock is first charged into the drum and in a few minutes is dried and heated; the asphalt is then added and the materials are mixed and heated simultaneously. With a charge consisting of 9 cu.ft. of broken rock and 10 gal. of liquid asphalt, a batch can be delivered in about three minutes when the rock is thoroughly dry before being charged into the machine. With rock that is very wet, a batch can be delivered in five minutes; in this case the rock is thoroughly dried and is too hot to be held in the hand before the asphalt is charged into the drum. The heater can be attached to machines already built, and it is an easy matter to learn how to adjust the burner to meet the desired conditions. It is stated that tests show that there is no liability of setting fire to the mixture. A modified form of heater has been designed, in which the air blower is dispensed with, the burner being placed at the rear of the chamber (in approximately the position of the air blower) and blowing the flame directly forward to the mixer drum.

A Simplified Challenge Feeder

By J. C. S. WHITTUCK*

In the JOURNAL of Nov. 18, 1911, H. B. Kaeding describes a simplified Challenge ore feeder. In the Journal of the Chemical, Metallurgical & Mining Society of South Africa, November, 1907, there appeared two illustrations, herewith reproduced, of simplified driving devices of which that shown in Fig. 2 is to all intents and purposes the same as that described by Mr. Kaeding.

Quoting from the above mentioned journal, R. G. Bevington in a discussion of a paper entitled "Notes on Feeders with a Description of a New Driving Device" says:—"I was interested on reading a paper given before the Institution of Mining & Metallurgy, describing certain mills in Western Australia, to see that the author gave a sketch of a driving device (also utilizing the old friction disk with the arm cut off) which he claimed to be an excellent one, and which very closely resembles some devices which are in use upon these fields." In Fig. 1 is shown a sketch of the device.

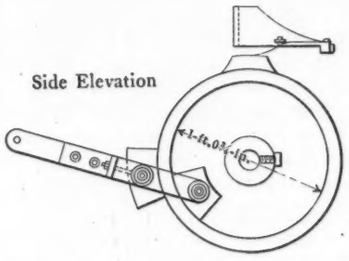


FIG. 1

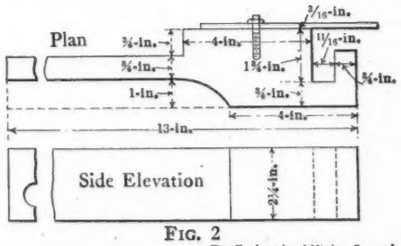


FIG. 2

The Engineering & Mining Journal

TWO TYPES OF SIMPLIFIED FEEDER DRIVES

With reference to Fig. 2, Mr. Bevington says:—"In the discussion upon the above mentioned paper I see that W. McDermott, who is one of the highest authorities upon milling matters, mentions a driving device brought out by Mr. Nelson in Western Australia, and which he says is of the simplest possible character, consisting merely of a loose fitting groove in the lever which grips the feed plate (I presume he alludes to what we call the friction disk) by the canting of the lever. No sketch accompanied Mr. McDermott's description, but I have had a driving device made on these lines and find that it works exceedingly well. Anything simpler and less expensive would, I think, be hard to find. I have had one running now for a fortnight and its performance is perfectly satisfactory."

*Fassett Road, Kingston on Thames, England.

Safety Appliances in Mines

BY LEE L. WILCOX*

The idea that the large corporation is a merciless machine organized and conducted entirely for making large profits for its stockholders, having absolutely no regard for the comfort and safety of its employees is a common one. Whenever an accident happens the sympathy of the general public is for the unfortunate victims and often the corporation comes in for undeserved criticism. This idea may have had some foundation in the past, but at present every large mining company on the Mesabi range is spending annually thousands of dollars in providing for the comfort and safety of its employees.

It is the purpose of this article to describe the various means and devices used at the mines of the Republic Iron & Steel Co.

They naturally divide themselves into two classes; those tending to prevent accidents and minimize the dangers to which workmen are subjected, and those which relieve suffering and lessen the attendant dangers after an accident has occurred.

The first class, being preventive, has occupied most of the time and has included every phase of work about the mines. It was started by the appointment of a committee from among the mining captains and mechanics, whose duty it is to make regular monthly inspection trips, to report on the condition of the various mines and to recommend means for improving the conditions where in their judgment it seemed necessary. This committee performs its work faithfully and efficiently, and the result has been the extensive adoption of safety appliances.

This can be best described by citing some of the devices employed. In the shops all pulleys, belts, gears, and such equipment are enclosed with strong wire-cloth guards. Line shafts and jack shafts are provided with overhead walks for the operators when repairing or oiling. Hoisting engines, compressors, and other machines are protected by substantial handrails wherever moving parts might endanger the employees, also stairs, ladders and elevator platforms. In fact, during a recent visit, the state factory inspector expressed himself as being favorably impressed with the work that has been done.

In the matter of underground protection the company is very particular. All openings, such as shafts or raises, are thoroughly protected by gates, railings or bars, making it practically impossible for a man to step into them accidentally. In addition to this ore chutes are equipped with grates, and ladderways are provided with permanent platforms at intervals of about 12 ft., through which are left openings only large enough to allow a man to pass. Ladderways in hoisting shafts and air shafts are electric lighted wherever possible, and no one is allowed to carry a lighted candle in them, thus insuring protection against fire.

The shafts are also equipped with sprinkling devices for use in case of fire. These are made by running a 2-in. pipe the entire depth of the shaft, leaving openings about every 10 ft. Into these openings are connected pipes which extend horizontally around the shaft and which are drilled with ¼ holes at intervals of four inches. The stations and pump-rooms in the mines, where there is little water, are protected in the same manner. The places so protected can be thoroughly sprinkled in a short time.

In dealing with the second class of safety appliances, which have to do with conditions after an accident, the company has installed two complete sets of the Draeger rescue apparatus, 1910 type, one pulmotor and the necessary secondary equipment to keep this apparatus in perfect working order all the time.

Rescue parties consisting of from four to eight men, who are entirely familiar with the underground workings, have been organized at each mine. These parties are drilled regularly in the use of the apparatus. The drills consist of climbing ladders, using picks and shovels, carrying men and other such work. They will be varied from time to time as the instructor may direct. Together with the rescue parties first-aid parties are being organized. These will hold their regular meetings and drills. The company will endeavor to have a physician at these meetings to instruct the men how to handle injured men and how to apply bandages.

It will be seen from this that the company is not unmindful of the safety and comfort of its employees. Every official is watchful of the safety of the workmen, and no expense is spared where protection is promoted.

*Chief engineer, Republic Iron & Steel Co., Gilbert, Minn.

Iron River District, Michigan

By P. B. McDonald*

This district was neglected for a long time but has witnessed rapid development during the last five years and now more than 15 independent companies are operating there. The ore is a medium-soft, red hematite and requires crushing.

*102 West Main St., Negaunee, Mich.

The Iron River district of Michigan has experienced a rapid growth in the last five years. Before that time there were known to be two or three medium-sized orebodies in the district and more or less desultory exploration was made. In 1911 there were 20 active mines operated by almost as many different companies, with an immense tonnage of ore proved. J. R. Finlay's appraisal of Michigan mines states that a comparison with the other districts would lead one to believe that "this district would produce 110,000,000 tons by the time it reaches the state of development in which the other districts are now. It contains one of the greatest ore reserves in Michigan, if not quite the largest. The annual tonnage expected is 1,290,000 tons. The present value of mines is $17,042,000."

Character of Ore and Costs

The ore is a medium-soft, red hematite, much of which requires crushing, and is nonbessemer; it is used for pig iron and openhearth steel. The expected average cost per ton of ore delivered at Cleveland is $2.65; the expected average value per ton of ore in Cleveland is $3.23; making an expected average profit of $0.58 per ton. As a basis of comparison the expected average profit per ton for several other districts follows: Crystal Falls district, $1.16; Iron Mountain, $0.82; Marquette Range hard-ore mines, $0.98; Marquette Range soft-ore mines $1.08; and $0.66 in the Gwinn district. Following is a table showing the analysis of cargo shipments from the mines in the Iron River district in 1909, as published annually by the Lake Superior Iron Ore Association, of Cleveland, Ohio. The upper line of figures represents the analysis when the ore is dried at 212° F.; the lower line when in its natural condition.

Much Drilling in Recent Years

There are few outcrops in the district; the country is deeply drift-covered and rolling. Practically all of the preliminary exploration is by diamond and churn drilling, at a cost of about $3 per ft. There has been a great deal of drilling in the last few years and remarkable results have followed in many cases. The early mines were located in the river valley southeast of town; in addition it was known that iron formation exists seven miles to the east at the Chicagon mine and there were a few indications north of the village. A farmer living half way between the Chicagon mine and Iron River finally succeeded in inducing a company to drill his 80 acres. He had previously given a blacksmith a one-quarter interest in his mineral right, in payment for a second-hand reaper worth $25. The farm now comprises the large Rogers mine, where the Foundation Co. of New York, has finished a concrete shaft; that part of the orebody so far proved is estimated on a conservative basis at 2½ million tons.

The Houlihan property, north of the Caspian mine, could have been bought six years age for that many thousands of dollars. Today it is believed to contain 5 million tons of ore. About 1½ miles north of the town of Iron River, Escanaba men spent several thousand dollars in drilling and discovered the present Gleason mine, with an orebody estimated in the millions. In several instances, furnace men in the East, hearing of developments in the Iron River field, have sent a representative to buy likely looking land as close to operating mines as could be purchased without spending too much money in one place. Not a few of them were agreeably surprised to discover by diamond-drilling, that the property acquired as a casual venture was worth several hundred thousand dollars.

District Discredited at First

As far back as the oldest miners in the district can recall it was sagely prophesied that "all the good land has been taken up by the big companies." If an enterprising spirit suggested that there might be ore on a certain tract, it was pointed out that some company had drilled two holes and sunk four testpits on the place several years before. Yet in many cases land which had been scratched a little in half-hearted exploration, was later optioned by people willing to risk more, and in some cases large mines were discovered. In fact there has lately been a regular business in acquiring abandoned and "black-eyed" properties, for systematic exploration. Several of the companies that came into the field last secured better properties than the older established companies, because having no prejudices they took chances that the others would not.

Later exploration has been deeper and much more systematic than the early attempts. The iron-bearing formation is said to be less than 300 ft. wide, and in general it stands nearly vertically. However, so intricately has it been folded and crossfolded that it covers a wide area. W. H. Selden has shown the ore formation to extend considerably to the west of the Hiawatha mine; the Iron River Ore Co. and others are succeeding in finding ore to the west of the town, and it is not known how far in this direction the formation lies. It is thought, however, that the ore-bearing area converges west of Iron River. The Bates Mining Co. has found an orebody on section 19, south of Sunset Lake, and exploration is tending in this direction. The Gleason exploration on section 35, south of the Chicagon mine, indicates the possibility of the area between Chicagon Lake and the Rogers mine. There has even been talk of the possibility of a connec-

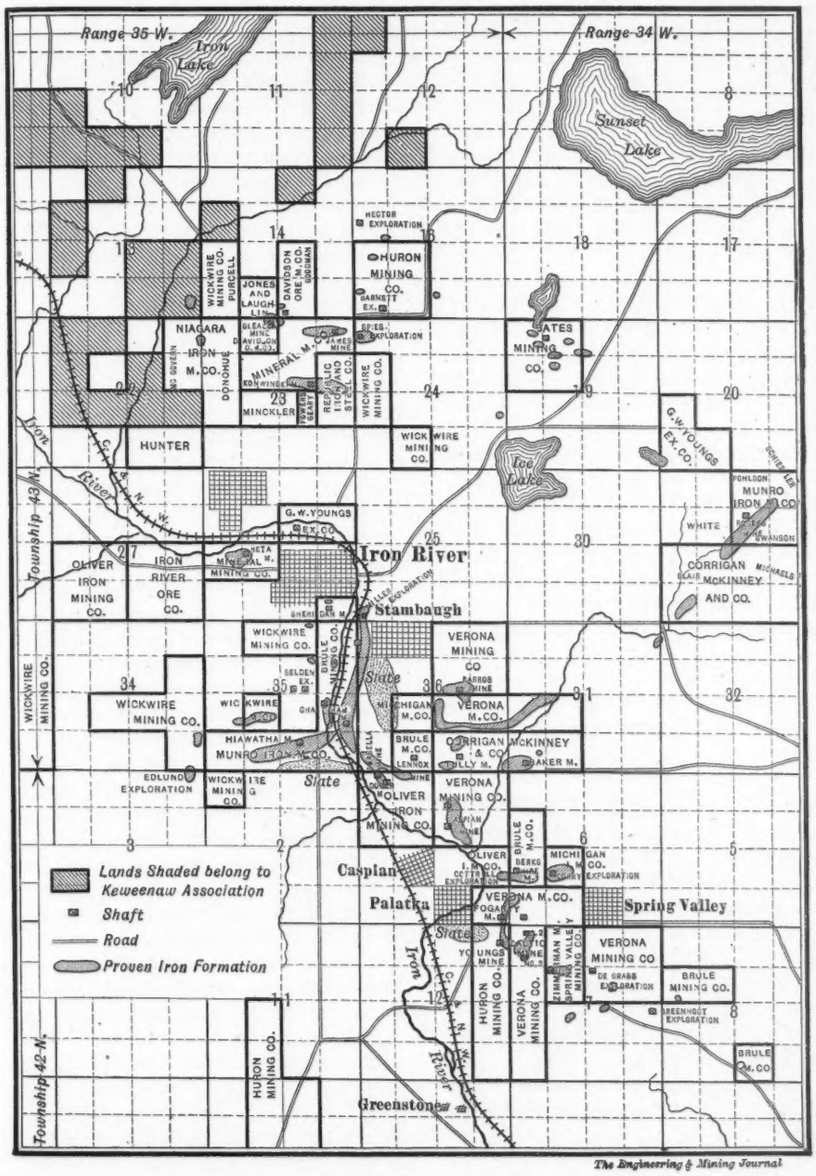
CARGO ANALYSES OF IRON RIVER ORES

Ore		Iron	Phosphorus	Silica	Manganese	Alumina	Lime	Magnesia	Sulphur	Loss by Ignition	Moisture
Baker	dried	56.67	0.313	7.460	0.280	1.470	1.630	0.920	0.009	5.150	.....
	natural	51.875	0.2860	6.8169	0.2558	1.3432	1.4895	0.8406	0.0082	4.7060	8.620
Baltic group (Baltic, Caspian, Fogarty)	dried	55.40	0.493	7.88	0.36	3.08	1.50	1.87	0.033	5.01	.....
	natural	49.83	0.4435	7.088	0.32	2.770	1.349	1.682	0.0297	4.506	10.05
Berkshire	dried	54.45	0.709	8.25	0.18	4.23	2.79	2.40	0.031	2.45	.....
	natural	48.10	0.626	7.29	0.16	3.74	2.46	2.12	0.027	2.16	11.66
Chatham	dried	54.50	0.346	9.39	0.21	2.73	0.79	1.05	0.088	6.71	.....
	natural	51.37	0.326	8.85	0.20	2.57	0.74	0.99	0.083	6.32	5.75
Dober lump	dried	55.826	0.633	5.35	0.349	.....	.....	.....	.....	.....	.....
	natural	53.760	0.61	5.16	0.336	.....	.....	.....	.....	.....	3.70
Hiawatha	dried	49.87	0.35	14.16	0.234	4.20	1.30	1.75	0.084	.....	.....
	natural	46.34	0.325	13.15	0.217	3.90	1.21	1.63	0.078	.....	7.08
James	dried	54.89	0.480	9.60	0.30	0.99	0.40	0.20	0.015	9.02	.....
	natural	50.50	0.442	8.832	0.276	0.911	0.368	0.184	0.0138	8.298	8.00
Tully	dried	56.100	0.580	8.00	0.360	2.20	2.120	1.650	0.008	3.200	.....
	natural	50.490	0.522	7.20	0.324	1.98	1.908	1.485	0.0072	2.880	10.000
Youngs	dried	56.05	0.50	7.60	0.16	3.20	0.82	0.71	0.04	5.45	.....
	natural	52.1265	0.465	7.068	0.1488	2.976	0.7626	0.6603	0.0372	5.068	7.00

tion of the Chicagon orebody with the Crystal Falls district, as the two are but nine miles apart.

Wide Distribution of Ownerships

The district is unique in that the holdings are divided among about 15 independent operating companies. This is in contrast to other mining towns in the iron regions, where one, two or three companies have usually monopolized the



Map of Iron River District, Michigan

field. Exploration in the Iron River district has in general been successful, and the results obtained have many times repaid the capital invested in drilling and underground work. As compared to precious-metal mining, the principal point of difference affecting the financing of an exploration company, lies in the fact that a relatively large quantity of ore has to be shown to warrant the expenditures necessary for economically mining the product. Thus, such a result as a mine paying for itself "from the grassroots down" is a foregone impossibility.

Capital Required

The amount of capital required by an exploration company is larger than that necessary in many Western ventures, and $25,000 might be spent in diamond-drilling a property with no greater results than several boxes of drill cores of black slate. On the other hand, if the $25,000 was successful in finding a good-sized orebody, the property could probably be sold for several hundred thousand dollars. The iron ore usually occurs in large deposits and is fairly homogeneous throughout. An investor in iron-ore exploration must be prepared to lose the entire amount contributed, but if the project succeeds, and a great many do, there is little doubt about the immense profits that will accrue. As James J. Hill has said, "iron-ore deposits don't run away, nor go out of fashion."

The royalties paid in the Iron River district vary from 10 to 50c. per ton; the present average rate of royalty is about 25c. per ton. The prevalent manner of exploration is under an option drawn up for perhaps one year and signed by the exploration company and the owner of the land; at the same time a lease also is drawn up for perhaps 25 years (but not signed), stating the royalty per ton, minimum tonnage on which royalty shall be paid, etc., but this is not signed at that time. The exploration company may drill the land and at any time before the expiration of the year in which the option holds may sign the lease if the results from the drilling warrant.

New Application of Tungsten and Molybdenum

Prior to their production in ductile form, the two metals tungsten and molybdenum had but two applications each: in steel making, and in electric lamps, the tungsten for filaments, and the molybdenum for filament supports. This last use[1] is even better served by the drawn wires, and the majority of the tungsten lights now made in this country contain drawn filaments.

The tungsten- or molybdenum-wound electric furnace[2] has proved both cheaper than and superior to the platinum-wound furnace, both because of higher temperatures and quicker heating. Both metals form good substitutes for platinum, platinum-iridium, or iridium, in various contact-making-and-breaking devices. That this is the case, is the result of the good heat conductivity of the ductile forms of these metals, their relative cheapness allowing the use of comparatively large masses, both of these factors preventing the formation of a heavy non-conducting oxide coating, while under the conditions existing in these contacts the thin oxide coatings are conductors.

In the Röntgen tube tungsten has opened a new field. Owing to its higher melting point, as compared with platinum, tungsten gives the Röntgen ray operator an indestructible target, upon which the cathode rays may be more closely focused, resulting in sharper definition and shorter exposure.

The use of wrought tungsten for projectiles is being carefully considered. Its high specific gravity, 19.3, as compared with lead, appears to give it the theoretical advantages of a flatter trajectory and longer range. Its hardness and

[1]Journ. Ind. and Eng. Chem., Jan. 1912.
[2]Journ. Ind. and Eng. Chem., Dec., 1911.

high tensile strength should give it high penetrating power. Its high melting point will prevent fusion due to the heat from the charge and consequent erratic flight. Against this, however, is the possibility that the smaller tungsten bullet of the same weight as a copper-nickel-jacketed lead one will possess in an aggravated degree the disadvantage of the latter—unless it hits a man in a vital spot it doesn't stop him.

Indian Currency

The question of the currency standard for India has been much discussed during the last year. London naturally leans toward the full adoption of a gold standard, and there is a certain advocacy of it in India; the party advocating it there being in a position to make its arguments heard. On this point Messrs. Samuel Montagu & Co., of London, say in their annual circular:

Advocacy of the Gold Standard

The instant adoption of the gold standard is urged by a strong body of native opinion, but the pressure arises mainly from sentimental rather than practical reasons. So great a wave of prosperity is passing over the Indian Empire that the native bankers and merchants who are fortunate enough to ride on the crest of the wave, are prone to overlook the requirements of the vessel that bears them. Their ability to profit by the recent years of plenty depended on the maintenance of the "Pax Britannica," the vigilant care of the Raj minimizing famine, enhancing water supplies, financing railways and other means of communication, and—by no means least of all—holding a stable exchange between India and the outside world ever since the closure of the mint to the free coinage of silver was necessitated by the abandonment of bimetallism on the part of the Great Powers.

The Silver Rupee

It must be remembered that silver rupees have been from ancient times the only coins familiar to the varied and populous nations of India. The Indian authorities, therefore, have held before them the practical object of holding exchange steady with the West rather than the establishment of a theoretical single standard, and by the expedients adopted, the natives are becoming accustomed to sovereigns passing current as equal to 15 rupees, and having the choice of either gold or silver. The fact remains that gold is, at the present time, available, although for a limited period it was not. No demand on the treasury is made for it now, for, as in all other countries, when once it is known that gold is available, notes are preferred as being the more convenient. Notwithstanding the vast amount of rupees coined, occasions have arisen at subsidiary currency offices when silver rupees were temporarily not obtainable.

Chief Obstacle to a Gold Standard

The native Indian bankers seemingly ignore the chief hindrance to a prompt adoption of a gold standard. This lies in the enormous population of India and their relative poverty, which necessitate rapid expansion and contraction of the currency handled by the masses according as the harvests happen to be successful or not. Ceres does not empty her cornucopia into the lap of a favored few, but she lifts a large proportion of 300,000,000 of people from extreme poverty into a position to pay off old debts, and even to provide a little for the future, or by the withdrawal of her favor, she deprives them of their all. To such poor folk gold is superfluous, their earnings must be paid in a coin of small value, a coin also to which they are accustomed by ancient usage, such as the silver rupee. A year of exceptional harvests may mean a demand for a sum equal to 20 crores of rupees, or £13,000,000, for the payment of crops, and of this by far the larger proportion is disbursed to the tiller of the soil. Herein is the crux of the difficulty which confronts the Indian government. The treasury must be prepared to expand the currency by huge amounts of silver rupees at a few months' notice, and also, perhaps at equally short notice, to receive them back, so that when times are bad India can be in a position to pay her debts to other countries in gold.

The Present Currency System

The methods adopted by the Indian government, if persisted in long enough to accumulate an adequate reserve, obviate the necessity of a large loan to form a gold reserve, and safeguard the estimation of the silver rupee in the public mind, for, when a gold basis is fixed, silver rupees will be relegated by a stroke of the pen to a position of inferiority. In times of scarcity a prejudice would be created against the coin of the poorer classes, who would thus suffer much hardship at a time when least able to bear it.

The special facilities which the Indian government possesses of drawing either rupees on India or sterling on London enable it to maintain the rupee as a hybrid coin, neither a mere token nor the basis of the currency, and yet exchangeable for sovereigns at a fixed ratio of 15 to 1 at the present time.

Effects of Gold Standard

Were a gold standard established tomorrow it would not put a pie into the waistcloth of the ryot, whose interests should weigh more with the rulers of India than those of the prosperous bunnia or native banker. If a gold standard were announced, and no restriction were placed on the amount of rupees legally tenderable to the treasury in exchange for gold, the government could not avoid similar methods to those now used unless a loan were launched and a wasteful stock of gold provided. Inasmuch as the equilibrium of the exchange is maintained in any case, it is difficult to see what further advantage would accrue to India than what is enjoyed already. The wise course lies in accustoming the public to use sovereigns and rupees side by side, and in building up a sufficient reserve from the profits on coinage silver. It is evident that the sovereign is actually entering into general use, and when the proportion in which sovereigns and rupees are circulating becomes reduced, the inflation or deflation of silver currency will cease to be a cause of embarrassment to the treasury.

Suggested System

If it seemed desirable to assist the utilization of gold, and to retard the demand for silver, notes of large denominations might be made payable in sovereigns (15 rupees to the sovereign) and the government might reserve the right to demand sufficient notice to allow of the purchase and coinage of silver, whenever gold was tendered on a large scale for exchange into silver rupees. This would place the treasury in a position to feel the pulse of the circulation and to prescribe the necessary remedies.

Meanwhile the profit of coining silver rupees, whenever the depletion of the stock in the currency reserve renders such a step necessary, is building up a handsome reserve, the securities of which can be realized, and the gold thus obtained can be replaced temporarily by any redundance of silver rupees consequent on the period of dearth, until such time as the turn of the tide carries the silver surplus back into circulation.

The contention advanced in Indian financial circles that gold reserves should be kept more liquid is well founded. This condition could be effected if short-dated government obligations were substituted for the consols now held by the treasury. Thus not only would the nearness of the due dates curtail depreciation in case of a forced sale, but the capital, if held thus invested until due date, would remain intact, and the interest, being compound, would place the currency, in course of time, on an unassailable basis. The enormous annual importation of gold bars and sovereigns in late years has relieved the treasury of pressure to which it might otherwise have been exposed, and the existence of such huge hoards of gold in the country cannot fail to be a source of support when perfectly free circulation of gold becomes an accomplished fact.

Tariff Legislation

WASHINGTON CORRESPONDENCE

The Democrats of the Ways and Means Committee have made public their revised bill relating to the iron and steel duties. This bill places iron ore on the free list. Pig iron is 8%; scrap iron, 15%; the provision as to "melting" in the case of scrap iron is eliminated. Slab, bar and bloom iron is 10%; beams, girders, etc., 15; boiler iron, 20; iron and steel sheets, 15; anchors and forgings, 15; hoop, band and scroll iron, 15; steel rails, 10; iron and steel sheets, 20; steel ingots, 10; rivet, screw and fence wire, 10; round iron and steel wire, 20 per cent.

DEFINITION OF STEEL

An interesting provision is as follows: "(16) All metal produced from iron or its ores, which is cast and malleable, of whatever description or form, without regard to the percentage of carbon contained therein, whether produced by cementation, or converted, cast, or made from iron or its ores, by the crucible, Bessemer, Clapp-Griffith, pneumatic, Thomas-Gilchrist, basic, Siemens-Martin or openhearth process, or by the equivalent of either, or by a combination of two or more of the processes, or their equivalents, or by any fusion or other process which produces from iron or its ores a metal either granular or fibrous in structure, which is cast and malleable, excepting what is known as malleable-iron castings, shall be classed and denominated as steel."

Steel alloys, such as ferromanganese, chrome or chromium metal, ferrochrome or ferrochromium, ferromolybdenum, ferrophosphorus, ferrotitanium, ferrotungsten, ferrovanadium, molybdenum, titanium, tantalum, tungsten and ferrosilicon are 15 per cent.

Throughout the bill a characteristic feature is the abandonment of the old specific and combined specific and *ad valorem* rates, and the substitution of plain *ad valorem* duties.

OTHER METALS

Included with the changes in the iron and steel schedule, which are to be made by the forthcoming bill, are revisions of the paragraphs relating to lead, antimony and other metals. A general reduction has been made in these, just as in the items of the iron and steel schedule. Considerable criticism is being manifested because the unsatisfactory smelting and bond provisions of the law have not been eliminated or changed. It does not appear likely, so far as can be learned, that much if any alteration will be introduced in these particulars, even when the bill goes to the Senate. The plans of the Democrats who are working on the subject of tariff revision are to make as few changes in classification as they can and to confine themselves largely to rates of duty except in those instances where experience has made it plain that there are "jokers" or excess protection which, in their judgment, need to be eliminated. Some changes in the provisions relating to smelting have been talked of, but it seems exceedingly doubtful whether anything of the kind will be attempted at any time this session. The more changes of this sort are made, the more objection is usually offered to the enactment of a new piece of legislation, and consequently the more difficult it is to secure action on the plan suggested. It has been considered wisest, so far as practicable, where the meaning of provisions in existing tariff legislation is known as a result of court decisions, etc., not to make any innovations in present legislation.

In the tentative bill as it stands, aluminum of all grades and kinds is 25 %; antimony, 10% on the antimonial contents; bauxite, 10; copper plate, 5; lead ore, dross, etc., 25 on the lead contents; lead bullion, pig lead, etc., 25; crude metallic mineral substances, 10; thorium, monazite sand, etc., 25; nickel of all kinds, 10; nickel in sheets, 20; quicksilver, 10; type metal, 15 % on the lead content; zinc ore, free; zinc in pigs, 15%, and tungsten ores are free.

Transvaal Mining Supplies

JOHANNESBURG CORRESPONDENCE

Some idea of the market open for American manufactures in the Transvaal in connection with the gold, base metal and diamond mines, is shown by the following consumption for 1910: Belting, £119,942; bags, £30,649; bolts, nuts, washers and rivets, £52,674; candles, £237,599; calcium carbide, £29,349; iron and brass castings, £117,200; cement, £120,735; chemical and assay supplies, £155,478; coal-cutting machines, £5471; cyanide, 10,825,186 lb., valued at £447,494; electrical machinery, £826,848; explosives (blasting gelatin), 487,160 cases, valued at £1,109,299; gelatin dynamite and gelignite, 140,587 cases, valued at £252,739; No. 1 dynamite, 6693 cases, valued at £8701; No. 2 dynamite, 54,976 cases, valued at £7092; other explosives, 4713 cases. (Blasting gelatin is used almost exclusively by the gold mines except in some places, where gelignite is employed.) Detonators, 333,567 boxes; electric detonators, 286,335 boxes, safety fuse, 7,923,226 coils; steam, construction and rock-drill hose, £57,751; hand tools, picks, shovels, hammers, etc., £85,820; oils, 1,141,799 gal.; grease and tallow, 4,266,236 lb.; machinery and machine tools, £1,622,691; mill screens, £35,058; mill repair parts, £115,927; anti-friction metals, 287,557 lb.; packing, 491,343 lb., valued at £47,747; paint, tar, etc., £25,517; paraffin, 58,370 lb., valued at £33,938; pipes and fittings, £458,076; rails, etc., £321,339; rock drills, 3086, valued at £61,514; spare parts for rock drills, £152,152; wire rope, £132,706; cotton and manila rope, 375,823 lb., valued at £18,711; shoes and dies, 14,814,504 lb., valued at £133,148; bar, tool and cast steel, 2,195,409 lb., valued at £30,718; sheet steel, 13,410,952 lb., valued at £96,258; hand-drill steel, 5,216,117 lb., valued at £81,605; rock-drill steel, 6,285,966 lb., valued at £95,802; Oregon and pitch-pine timber, 1,945,586 cu.ft., valued at £357,314; deal timber, 6,979,170 cu.ft., valued at £201,390; trucks, £123,949, and zinc sheet, 8,467,113 pounds.

The Antelope Mine, in Southern Rhodesia

JOHANNESBURG CORRESPONDENCE

The Antelope mine at Gwanda, Southern Rhodesia is about 75 miles south from Bulawayo. The vein occurs in a narrow belt of schist about 16 miles long, which belt is bordered by granite. The ore is, at depth, a highly pyritic banded ironstone containing much pyrrhotite. The capital of the company consists of 1,600,000 shares at 5s., of which 1,100,000 were issued on an option.

The vein outcrops over a length of 2½ miles and there are numerous ancient workings on it. Shafts have been sunk along the strike for a distance of 1300 ft. The reef dips about 50° to the north and has been cut by a 13½ by 5-ft. vertical shaft at 700-ft. level. On No. 1 level 560 ft. of the main vein assays 9 dwt. over a stoping width of 36 in. On the eighth level the vein which has been driven on for 82 ft. shows 12½ dwt. over 43 in. The ore in sight is estimated at 60,000 tons containng an average of 10 dwt. gold per ton. It is intended to adopt the all-roasting process which, it is estimated, will give an extraction of 90 to 95% of the gold at a total cost of about 30s. per ton. Suction gas engines are used to supply electrical power.

Proposed Phosphate Land Law

A recent bill introduced in Congress (H. R. bill 17,247) provides that any *bona fide* locations made under nonmineral land laws, on lands subsequently found to contain phosphate deposits, shall hold, except that the United States shall have the right to dispose of the phosphate under the mineral laws in force at that time. Any miner of the phosphate, under these conditions, must give suitable security for any damage which may be caused the surface owner.

Recovery of Gold in Dredging

By Charles Janin *

In calculations of recovery most engineers take a percentage of the average gold content indicated by drilling, generally 75 to 80 per cent., as the recoverable amount, if preliminary work has been carefully done. Recoveries as high as 90 per cent. are unusual and sometimes range as low as 40 per cent. when spotty ground and careless prospecting prevail.

*Consulting mining engineer, Kohl Bldg., San Francisco, Calif.

The percentage of recovery made by a dredge of the average content indicated by prospecting a gravel area, is always an interesting question. Obviously to determine the difference between the actual gold content of the ground and the recovery of the dredge, it is necessary to know: (1) either the actual gold content of the ground previous to dredging, or (2) the actual loss in the tailing.

The thorough sampling of a placer property is by no means the simple matter the uninitiated often believe it to be, and much depends upon the care taken and the experience of the engineer in charge of the work whether the average value determined for the property will be representative or not of the total gold content. If the greatest care has been exercised in taking a sample, the work being properly done in every detail, the sample will then represent as nearly as possible the value per cubic yard of the place sampled. While each hole may then be taken as indicative of the value of that portion of the ground where it is sunk, the placing of holes is an important feature.

Sampling the Ground

The location and distances apart at which samples should be taken can be determined only after a study of the ground is made. Preliminary holes are generally sunk and carefully sampled to determine if the gold occurs in wide or in narrow channels, and if it is fairly evenly distributed throughout the deposit, or occurs in irregular pay streaks. There is no rule as to the number of holes to be sunk, but on ground that shows spotted or irregular contents. obviously more tests will be necessary than where fairly uniform values are obtained. Much time can be saved, in this respect, when the work is carefully planned and directed.

Sometimes it is feasible to segregate certain sections of a property, eliminating low-grade areas, and on larger areas, where time for the examination is limited, tests to confirm the value indicated by preliminary prospecting may be concentrated on a piece of sufficient size to determine the advisability of purchasing the property and installing at least one dredge. The accuracy of the average value of placer ground indicated by the examination, depends, therefore, upon the care taken in sampling, the number of samples taken, and the situation of the holes in relation to the character of the deposit. All hinges upon the experience and judgment of the man in charge.

Recovery in Dredging

In estimating the value of dredging ground after determining the average value indicated by prospecting, most engineers take a percentage of this indicated value, generally 75 or 80%, as the amount of gold content recoverable by the dredge. These figures are based upon actual tests made to determine the dredge recovery and also upon the percentages of the prospecting value recovered from certain dredged areas.

Use of a Recovery Factor

Some engineers, in estimating the value of gravel recovered from drill holes, use a factor which they claim experience has demonstrated closely represents recovery. The use of this factor practically discounts the prospect value which would have been assumed by the use of the ordinary drill factor. Any engineers adopting such practice should, of course, mention same in their report; otherwise the value they claim for a property may be further discounted by those to whom the report is presented, if they are not conversant with the methods employed in computing the value, and an injustice done the property under consideration.

It is difficult to sample the dredge tailing, and any test, to be at all representative, must extend over a considerable period. Tests made on dredge tailing by different companies have indicated an appreciable loss, but the tests did not, so far as I know, determine the percentage of gold recovery with any accuracy. Some ground in the areas first dredged will undoubtedly be redredged at a profit in the future, when lower operating costs are obtained by increasing the dredge capacity, as discussed in my paper, "Present-Day Problems in Dredging," read before the American Institute of Mining Engineers, at the San Francisco meeting.

Some Actual Recoveries

In a most careful test to determine the dredge recovery, 22 holes were sunk on a measured area. Results were from 3 to 52c. per cu.yd. and averaged 19c., the regular drilling factor being used in these calculations. In working, the recovery was, as near as I can remember, 17c. per cu.yd., or about 90%. Those companies in the Oroville field, which get the high percentage of recovery, are those which previously had discounted the prospecting values by 20 or 25%. One company in working an excess of 3,500,000 cu.yd., obtained a recovery that showed 72% of the average value indicated by prospecting. The ground averaged about 16c. per cu.yd.

Natomas Ground Mapped at 85% of Value Shown by Drilling

In this connection it is interesting to note an excerpt from Mr. Roelker's report on Natomas Consolidated: "The writer wishes to emphasize that according to the statement of the general manager, Newton Cleveland, the value of the different bore tests which are marked on the company's map, are the original value calculated reduced by 15 per cent., in order to make them representative of actual extraction." Only when the property is worked out will it be ascertained whether or not this factor is the right one.

While the tests referred to and the percentage of recovery assumed for a dredge have been figured from prospecting done under careful engineers, there are numerous instances, particularly of early-day drilling, when the recovery afterward made by the dredge was only 40% or less of the assumed average gold content of the ground. This was on account of careless or inexperienced work during the examination. A case in point with this is mentioned by J. E. Hodson, in "The Dredging of Gold Placers," referring to the Ashanti Goldfields Auxiliary dredging ground which had been tested with drill holes: "The bore holes had given from 5 to 11 and 13 grains per cu.yd., but the results achieved by the dredge never gave more than 2 grains," and again, "A dredge in New Zealand is reported as having recovered 40% of value indicated by bore holes."

If the work of prospecting has been properly done, an estimation of the gold content of a property can be made with some degree of accuracy, but, if the work has been carelessly done by unreliable or inexperienced engineers, the results obtained would be worthless and any refinement of recovery calculation ridiculous.

Chispas Cyanide Plant, Sonora

By Edward L. Dufourcq*

In this new 70-ton cyanide mill the current and accumulated concentrator tailings are all-slimed, agitated in Pachucas and filtered by a Burt apparatus. Zinc dust is used for precipitation.

*Consulting mining engineer, Produce Exchange Building, New York

Note—Abstract of an article in the School of Mines Quarterly, November, 1911.

The Chispas mine, situated in the Arizpe district of Sonora, Mexico, and owned by the Minas Pedrazzini Gold & Silver Mining Co., was worked from 1891 until 1900 for its production of high-grade shipping ore. The period from 1900 until 1903 was occupied in running a drainage tunnel under the former workings. At the time at which I assumed the management of the property in 1904, the veins had been cut by this tunnel and, in addition to some high-grade ore, considerable amounts of lower-grade ore had been discovered; a five-stamp mill had been erected with one concentrating table and two amalgamating pans.

Old Mill Used Concentration and Pan Amalgamation

This mill was enlarged as more ore was developed, until in 1910 it consisted of 20 stamps, three Wilfley tables, four 5-ft. pans and two settlers. During part of this period a portion of the slimes that did not pass through the pans in the ordinary amalgamation treatment were hoisted from the settling ponds after drying and oxidizing, and were treated in the pans by being mixed with the current coarse tailings from the concentrating tables. This retreatment of slimes was costly on account of the second handling, the extraction was unsatisfactory, and moreover the total current production of slimes could not be treated in the plant. The extraction in the mill averaged 58 to 60% by concentration and the pan amalgamation then extracted from 55 to 60% of the contents of the table tailings, the total extraction therefore, varying from 71 to 84 per cent.

In 1908 and 1909, experiments were made with cyanide and it was decided in 1910 to install this process, both because of the higher extraction possible and because of the much lower cost of treatment than by pan amalgamation. In this paper I shall outline the construction and detail of the cyanide plant.

Some description of the geology of the ore deposits has already been published[1] so that for the purposes of this paper it will be sufficient to mention that the ore consists of a rather clean quartz carrying the silver in the upper levels of the mine as chloride, and in the lower levels as argentite, polybasite and stephanite. The gold is free in the upper levels and throughout almost the whole vein is carried in about the proportion of 1 oz. of gold to 130 oz. of silver. The average of a number of partial analyses of the ore gave the following result: Insoluble, 80.6; iron, 2.4; lime, 1.6; sulphur, 1.6; antimony, 0.3%; zinc, trace; lead and copper, none. The insoluble is nearly all silica; the ore from the upper levels of Chispas vein, however, carries varying amounts, up to 3 or 4% of aluminum silicate, as does the ore from one of the parallel veins.

[1]Eng. and Min. Journ., Dec. 3, 1910.

Good Extraction by Cyaniding

The cyanide experiments with slime from the accumulation in the ponds below the former mill showed an extraction of 93% of the silver and 98% of the gold, on material which had been long exposed to the weather, and an extraction of slightly over 90% both of gold and silver from the coarser sand tailings which had not been so long exposed. The experiments further showed that the cyanide consumption would probably not exceed 3 lb. per ton of tailings and slimes treated, that about 0.2 lb. of lead acetate would be required per ton, slightly under 2 lb. of lime per ton to neutralize acidity, and that 36 hours' agitation by air would be required to effect the solution of gold and silver if the pulp were all slimed to pass at least 150-mesh, to which fineness it was found necessary to grind the tailings in order to reach 90% extraction.

The crushing section of the former mill, consisting of a 7×10 Blake crusher, and 20 stamps of 850 lb. dropping 100 times per minute with a 6½-in. drop, crushed 46 tons per 24 hours through a 20-mesh screen of No. 25 wire (aperture 0.027 in.). As about 26,000 tons had been treated by this mill up to the end of 1910, and of the tailings discharged over 12,000 tons had been saved in slime ponds, besides several thousand tons of lower-grade sand tailings, it was necessary to design a cyanide plant that would be sufficient to treat the current discharge of tailings from the concentrating tables (having decided to discard the amalgamation process) and at the same time to treat the accumulated slimes and tailings of the former mill. Allowing for ordinary mill stoppages, it was calculated that at least 40 tons per day of current mill tailings would have to be cyanided, and the plant was designed to treat in addition a minimum of 30 tons per day, to be taken from the accumulated slimes and sand tailings.

16-Mesh Battery Screens Used

It will be shown at what estimated capacity each machine in the new plant was taken and what allowances were made for extra work to be thrown upon any part of the plant. Due to the fact that a high extraction by cyanide could be expected, it was thought wise to change the mesh of the battery screen from the 20-mesh above noted, to 16-mesh with No. 22 wire, giving an aperture of 0.033 in., increasing in this way the stamp duty to possibly 3 tons per stamp per 24 hours. The four batteries of the mill have not yet all been equipped with the new screen, to determine whether the expected stamp duty will be attained. It is my opinion that this duty will be exceeded. The coarser feed to the Wilfley tables will of course result in a lower saving by concentration and richer table tailings, but as all the table tailings will be slimed in the tube mill, the ultimate saving will be greater, since the smelter, in buying the concentrates, pays only for 95% of the silver content. It is also expected to give the tables a greater inclination and make a higher-grade concentrate, so as to effect a saving in overland freight to the railroad. The smelter charges for briquetting and smelting concentrates, together with railroad freight and overland freight to the station, amount to $46 per ton whereas the refining charge on silver-gold bars is only 1c. per oz. (payment for full gold and silver contents) and the express charges on bullion are $4.25 per thousand ounces.

One of the accompanying plates gives the ground plan of the cyanide addition to the mill. For purposes of greater clearness, in preparing this plan some of the pipe-lines were omitted and a number of the launders. The positions of the 20 stamps, the concentrating tables and the power plant are only indicated in outline. The cyanide plant consists of the following machines and appliances: One 14-in. belt conveyor, 160 ft. long, running at a belt speed of 105 ft. per min., brings the slime up from the ponds below the old amalgamation plant to a masonry mixing tank, 16 ft. in diameter. The current mill tailings, after leaving the Wilfley tables, are dewatered and also discharge into this mixing tank. A bucket elevator, with 5×8-in. buckets, raises the combined

tailings and slime to a Dorr standard simplex classifier.

Below the Dorr classifier is an Abbé tube mill, 4½×20 ft. with trunnion bearings, and furnished with El Oro type of lining. To facilitate transportation by carts, this tube mill was made in two parts, the shell being cut in two and each half having a ring riveted to it, carefully faced, so as to give exact alignment when the two rings were bolted together on the ground. Danish pebbles are used in the tube mill, the initial charge being 16,000 lb., half of which were of the No. 3, or largest size, the remainder being about 5000 lb. of No. 2 and 3000 lb. of No. 1 size; subsequent feed, of course, is all of No. 3 size. Such additional water as is needed in the tube mill, for maintaining the proper consistency for grinding, is added as weak solution; the stamp milling is done in water in order to avoid consumption of cyanide by the metals removed with the concentrates.

At the discharge end of the tube mill is a second Dorr classifier. Above the tube-mill building are two stock solution tanks of steel, 24 ft. diameter and 8 ft. deep, for strong and weak solutions, capacity 27,000 gal. each. Outside of the tube-mill house, and at a slightly lower level, is situated a Dorr thickener in a steel tank 24 ft. in diameter and 8 ft. deep. Beyond this, as there was not enough fall available, it was necessary to put in a short air lift which is easily operated, on the thickest slime handled, by about 4 lb. of air pressure, which raises the thickened slime to the box from which it is distributed to the six agitation tanks.

Details of Agitation Tanks

These tanks are of steel 12 ft. in diameter and 36 ft. high, with a conical bottom sloping 60°, having a capacity of 25,000 gal. each. The detail of the construction of these 36-ft. tanks is as follows: The top ring is composed of No. 10 steel, four pieces to the circle, 8 ft. high, single riveted at the top to a 3×3-in. angle iron, single riveted at the lower side to the second ring, which is 6 ft. 6½ in. high and is made of No. 9 steel. Below this follows the third ring 6½ ft. high, made of No. 8 steel. At the bottom of this third ring is a double row of rivets fastening the third ring to the fourth, the fourth ring being of No. 7 steel, six pieces to the ring. This fourth ring is 6 ft. 8 in. high and is fastened by a double row of rivets at the bottom end to a 6×4-in. angle iron. The cone joins at this point, being riveted both to the sheet of the fourth ring and to the angle iron. The cone is made of ¼-in. steel in six pieces. The height of the cone is 9 ft. 8 in. and at the bottom end is riveted by a double row of rivets to a 10-in. standard cast-iron T, on one side of which is a blind flange and on the other side a 10-in. gate valve. The bottom of the T is supported on concrete.

There is no mechanical agitating device in these agitation tanks, but they are provided with the Towne patent air agitator. This consists of a central pipe 10 in. diameter, reaching nearly to the bottom of the cone and perforated by rows of 4 holes, 1½ in. diameter, the rows of holes being 1 ft. apart except at the upper end of the pipe, where, for 2 ft., they are 6 in. apart. Almost at the top level of the tank there are four 2-in. pipes leading outward and spirally curved from the central pipe towards the circumference of the agitation tanks. The central pipe extends 2 ft. above the top of the tank and is open at the top. Air is admitted through a 1½-in. pipe passing through the blind flange in one side of the 10-in. T at the bottom of each cone. The air pipe enters the center of the central pipe and is turned upward inside of it for about 18 in., terminating in a vertical ball check valve. The discharge from each agitation tank is controlled by a gate valve, all tanks connecting into one central pipe leading to the suction of an Aldrich triplex slime pump, of 6×7 in. size.

Burt Filter and Zinc Dust Used

On one side, and above the Aldrich slime pump is situated the Burt filter, 42 in. diameter by 20 ft. 8 in. long. The Burt filter is an iron cylinder, inclined 45°, into the lower end of which the slime is forced under a pressure of 40 to 50 lb. per square inch. In the cylinder are suspended the filter mats of cocoa matting covered with canvas, their frames being perforated pipes connected to a common discharge pipe running along the top of the cylinder out of which the filtered solution passes. The pressure being positive and three times the atmospheric pressure being obtainable, this type of filter is preferable for slimes containing high silica and little alumina, and is quicker in operation than the vacuum types.

A masonry tank, 8×8 ft., 4 ft. deep, is provided at one side of the Burt filter to receive the excess slime discharged from the filter after the cake is formed and before the weak solution is forced through the cake for washing. The strong and weak filtered solutions are collected in the respective tanks beyond the Burt filter, these tanks being of steel, 16 ft. in diameter and 8 ft. deep, capacity 12,000 gal. each. The solutions are drawn from these tanks for precipitation by zinc dust, which is added by means of two types of zinc feeders, a Colbath and a Creston-Colorada, which are placed inside the zinc room. A filter press of 12 leaves, 24×24 in., made by the Creston-Colorada Company is used for the product. The barren solutions are run to two sump tanks outside the building, these being of steel and of 24 ft. diameter for the weak solution and 16 ft. for the strong, both being 8 ft. deep. A Deane triplex pump is used for pumping the zinc and solution into the product press, and Deane triplex pumps are also used for returning solutions to the stock tanks.

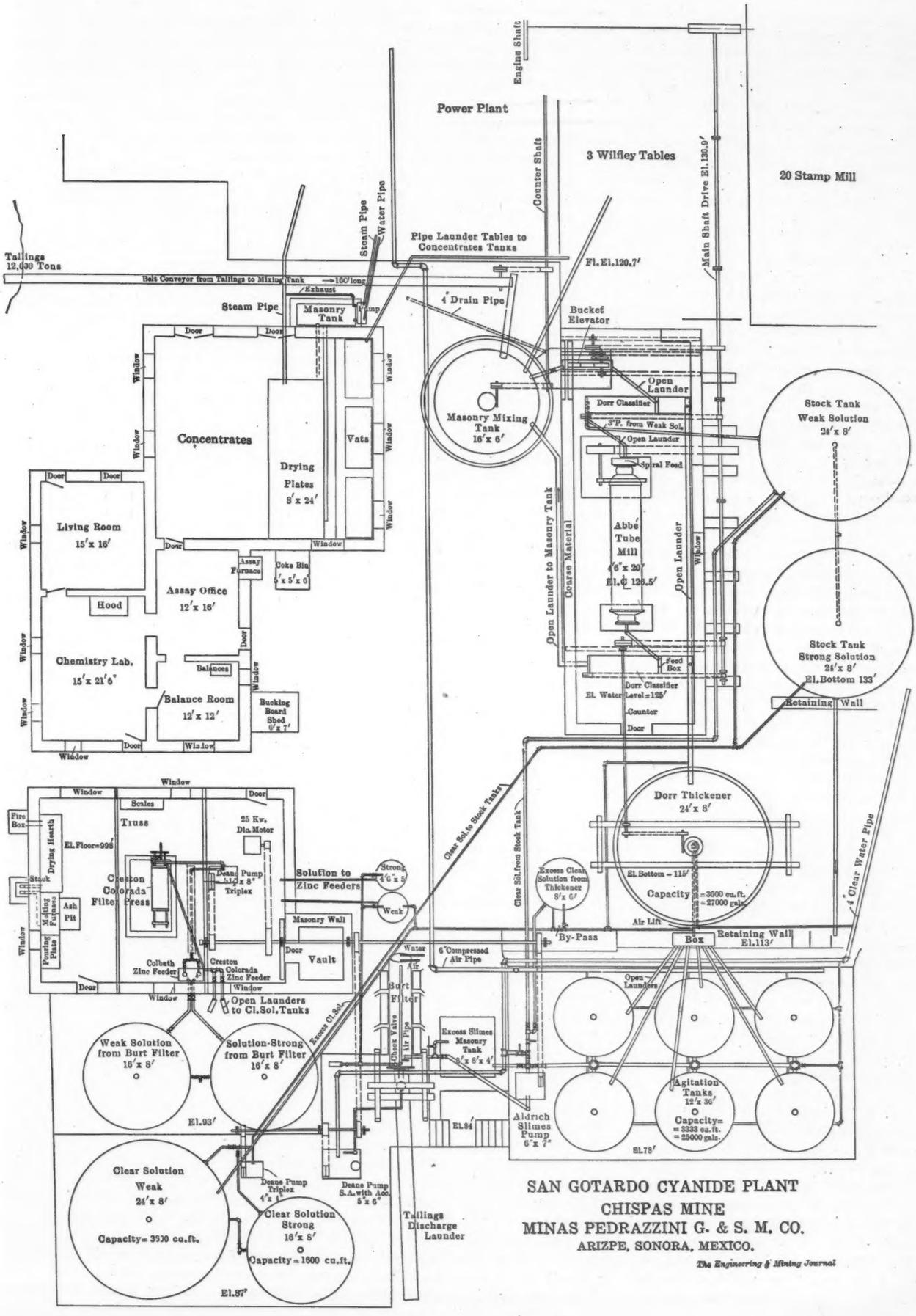
Power Details

Power for all the triplex pumps and for the feeders is provided by a General Electric type DLC, direct-current, 220-volt motor of 25 kilowatts, situated in the zinc room. All the other power is derived from the main line shaft of the mill, which is driven by a 150-hp. Hamilton-Corliss engine. The generator, which supplies the current for the motor as well as for the lights and for the assay office motor, is situated in the main power plant and consists of a Buffalo Forge Co. engine of 90 hp., direct connected to a General Electric form RB, 6-pole, 250-volt generator of 50 kilowatts.

Compressed air is furnished by two compressors built by the Chicago Pneumatic Tool Co., and about 20 lb. of air pressure is maintained. The normal amount of air furnished is 320 cu.ft. of free air per minute, which however, will probably prove too small if more than four of the agitation tanks are being operated at one time; air is also needed for the Burt filter and for the air lift, the lower pressure therein required being obtained through a reducing pressure valve. It is to be noted that all the valves, cocks and glands or stuffing boxes that are to be in contact with cyanide solution are of iron, no brass being permissible. The masonry tanks are faced with cement, which was then washed with ammonium carbonate solution and then painted with cyanide paint.

In addition to the appliances shown in the plan, there are three tanks, one a steel tank 6×8 ft., situated on the mountain side, 290 ft. above the Burt filter, for accumulating hydraulic pressure to operate the filter door, and the others are masonry tanks situated at about 80 ft. above the mill, for excess solution and for slimes which also are required to be under pressure, as will be shown in describing the operation of the plant.

Due to the situation of the camp, with a 72-mile wagon haul from the railroad at Cananea, all the tanks were shipped knocked-down and the riveting was done on the ground. Ingersoll riveting hammers were used, the compressor for the air agitation furnishing the compressed air. It was somewhat of a risk to use this compressor, which was designed for



SAN GOTARDO CYANIDE PLANT
CHISPAS MINE
MINAS PEDRAZZINI G. & S. M. CO.
ARIZPE, SONORA, MEXICO.

The Engineering & Mining Journal

a maximum of about 50 lb., but had to be run at 80 lb. to furnish effective air pressure for the riveting hammers. The stock and solution tanks are of ⅜-in. steel, both sides and bottom, and are painted with cyanide paint, two coats inside and one coat outside. They rest on rough rubble masonry foundations, timber being out of the question, as the wagon freight alone on rough pine amounted to 90 pesos per thousand feet.

Unique Support for Pachucas

The ordinary Pachuca type of agitation tank, so far as I had seen it installed in other places, seemed to involve a waste of material in having the cylindrical sides carried to the ground, with the cone at the bottom built inside; such construction also leaves the bottom of the cone, with its valves and connections, rather inaccessible. I therefore decided to support the agitation tanks at the top of the cone, by using a 4×6-in. angle iron, which is riveted to the tank sheets. This angle iron rests on a curved I-beam, 7-in. standard section, made in four pieces, each one-quarter of the circumference of the outside of the tank. This circular I-beam is carried on eight columns, made of 6-in. pipes, with special castings for bases, and capped by castings terminating in a flange conforming to the circle of the I-beam. The pipes are filled with cement concrete and the castings are threaded on, but care was taken to have the ends of the pipe "bottom" into the castings so that the strength of the column would not rely on the strength of the thread. These pipe columns are 12 ft. high and are braced laterally at half their height.

The agitation tanks are set up in three rows of two, and are held together at the top of the cones and at the top of the tanks by steel plates fastened to the angle irons which encircle the tanks. The whole set of tanks is anchored by six horizontal bolts to the retaining wall which sustains the ground forming the bench carrying the Dorr thickener. One Dorr simplex classifier at the head of the tube mill was thought to be sufficient to handle the entire feed that will go to the cyanide plant, on the assumption of 30 tons of the old slimes per day with 40 tons of the current mill table tailings of which over 40% will be slime, but it is probable that the sizing capacity will not be found sufficient when the 20 stamps are all operating on the new 16-mesh screen, and in order to take out all the material of the size to be fed to the tube mill it will probably be necessary to install an additional classifier. On the other hand, the Dorr classifier at the discharge end of the tube mill, which will take out the material which has not been ground to sufficient fineness, will have an exceedingly light load except when the tube mill is crowded by a large proportion of coarse sands coming from the old slime ponds. The thickening process is necessary, as the undersize from the first classifier contains a large amount of water, and the discharge from the tube mill and the second classifier contains too much weak solution to allow the pulp to be passed in this condition to the agitation tanks, since we there require a pulp of of 1:1½ or 1:2, with strong solution.

Estimated Capacity 70 Tons

The capacity of the agitation tanks was figured on a basis of about 35 tons of dry slime to each tank, two tanks being filled in each 24 hours; allowing 36 hours for agitation and 12 hours for settling and decantation, we would always have one pair of tanks emptying and filling, with two pairs of tanks agitating on any given day, thus discharging 70 tons of slime as a minimum to the Burt filter in each 24 hours. It is found that the upper 8 ft. of the contents of a tank will settle in a few hours sufficiently clear to allow decantation, the clear solution not requiring to go to the Burt filter; for that purpose a 4-in. decanting pipe is provided 8 ft. below the top of each agitation tank. The only clarifying that this solution needs before going to the zinc precipitation is provided by sand filters on the false bottoms of the two 16-ft. tanks where the pregnant solutions are held.

The capacity of the Burt filter of the size adopted (42 in.×20 ft. 8 in.) was more problematical, as it depends entirely upon the rapidity with which each operation on the cycle of filtering is conducted. The Aldrich slime pump, if driven so rapidly as to effect a quick filling of the filter, also produces an excessive pressure, and it was decided, at the suggestion of Edwin Burt, to put in one of the masonry tanks on the hill at 80 ft. elevation, which is connected with the discharge of the slime pump so that the pump could run continuously and yet during the time that the filter was filling the excess slime collected in the upper tank would run back quickly to the filter.

The original calculation for the Aldrich pump (6×7-in. triplex) was 100 gal. per minute; taking an agitation tank of 25,000 gal., from which about 6000 gal. had been decanted, there would remain 19,000 gal. which could be taken care of by the Aldrich pump in about 3½ hours, allowing the balance of the time out of each 12 hours for forming the cake, pumping through the wash solution and discharging the washed filter cake. The Burt filter, operated under the original condition, was filled, washed and discharged once in about 50 minutes, but it is hoped to improve this with the use of the high tank for quicker filling with slime, and in this connection the second of the high masonry tanks (80 ft. elevation) is used for weak solution to effect a quick washing of the filter cake (four minutes). The filter should then easily handle over 70 tons, possibly 80 tons, in 24 hours. Increased capacity is also expected by the use of thicker pulp in the agitation tanks; at the present writing, charges of about 38 tons of dry slime per tank are being experimented with, in place of 35 tons.

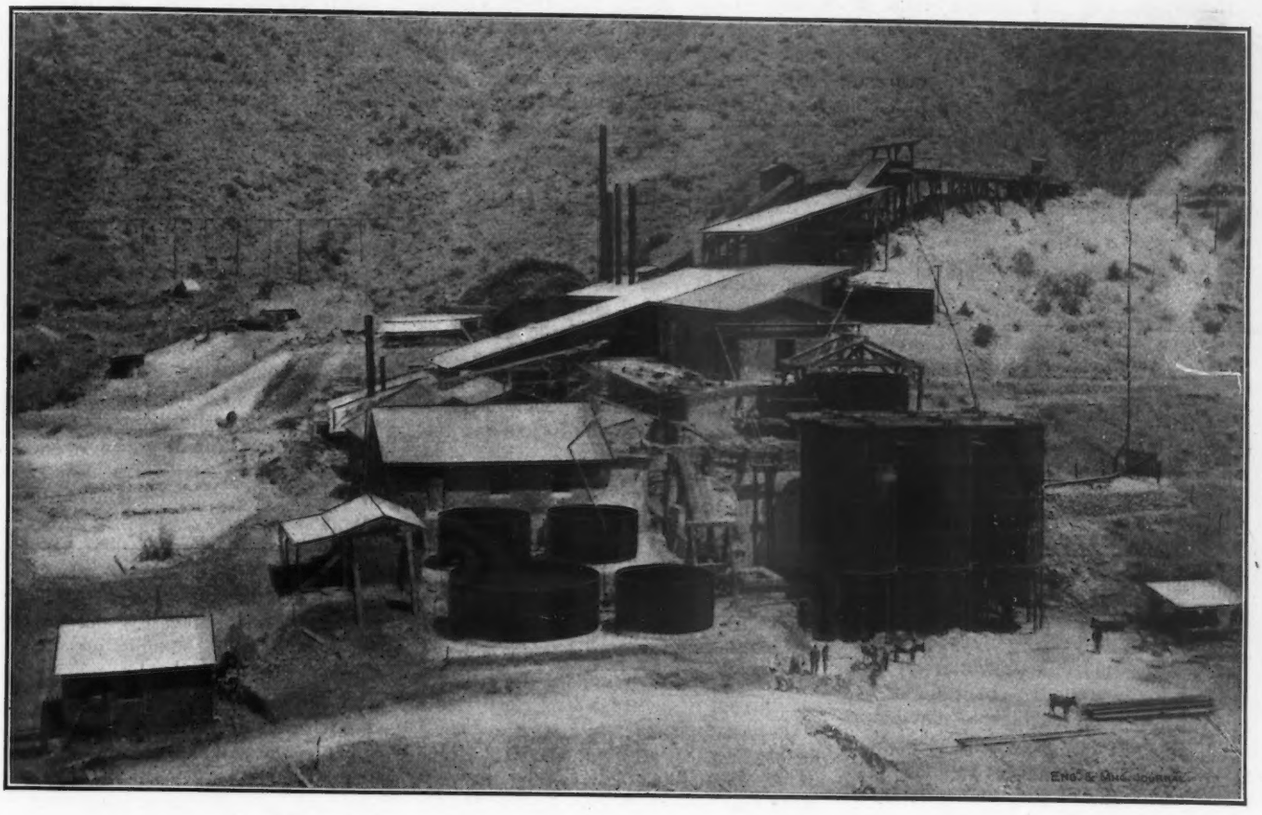
Experimental work is still going on to determine exactly the best method of mixing the zinc dust with the solutions to be precipitated. Two types of feeder are being used, as stated in the outline of the machinery adopted. Variations in the manner of applying the zinc to the solution feed pipes still have to be tried.

The filtered precipitate is dried in pans in a reverberatory hearth, heated by a light fire. After drying, and mixing with fluxes, the melting and refining is done in No. 60 graphite crucibles in two coke furnaces.

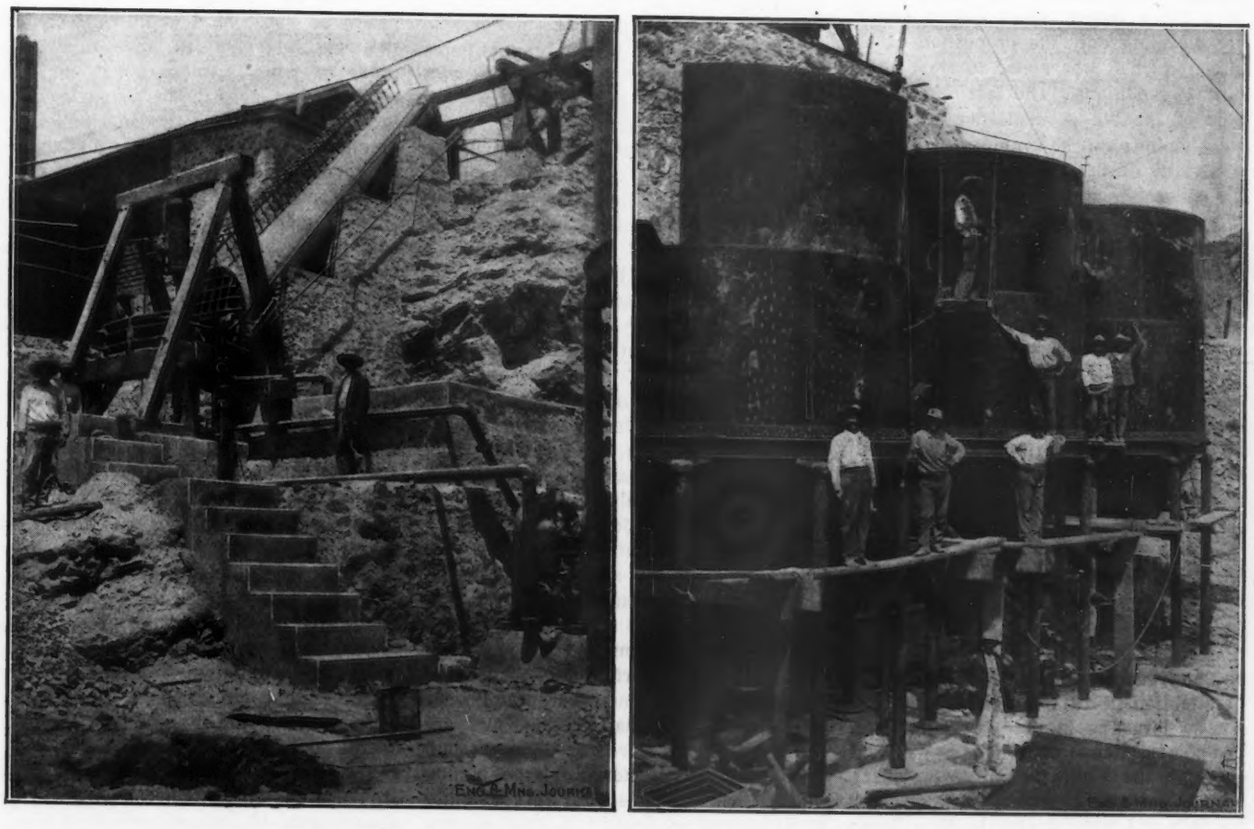
Plant Built in Six Months

The entire plant was constructed without interrupting the operation of the concentrating mill and the old amalgamation process. The construction of the cyanide plant necessitated the building of a new assay and chemical laboratory, to make room for the new concentrate house, this being required as the concentrate was formerly dried, sampled and sacked in the house occupying the space taken for the tube mill. This gave an opportunity for improving the method of handling concentrate. Formerly this was shoveled from boxes at the end of the Wilfley tables and removed in wheel barrows, whereas at present the concentrate drops through a launder and pipe to a lower level and is dewatered in masonry tanks and then shoveled to a steel drying plate 8×24 ft., which is kept hot by the exhaust steam from the compressor.

The time consumed in erecting the plant was much prolonged by the outbreak of the Mexican revolution. Labor conditions were much upset, many of the blacksmiths, riveters, mechanic's helpers and masons leaving their work to join the revolution; the efficiency of those remaining, or of the new men secured, was only about half of the normal. Many shipments of machinery were delayed through suspension of train service at the border, and through the temporary closing of the Mexican Custom Houses. After the machinery reached the end of the railroad, there was great difficulty in securing a sufficient number of freighters to haul to the mines, since at that time the revolution was at its height and raiding parties were daily seizing all available horses and mules.



THE CHISPAS CYANIDE PLANT AT ARIZPE. SONORA, COMPLETED MAY 25, 1911



THE BURT FILTER AND AGITATION TANKS OF THE CHISPAS MILL

Notwithstanding the delays thus occasioned, the plant was completed in just under six months from the time the excavation was ready for the masons to start. A number of changes in pipe lines, launders and tanks were subsequently made and more will undoubtedly be necessary as experience is gained with the particular type of ore to be treated.

Some Changes Necessary

At present, with only a short experience yet available, I would make the following criticism of the plant as we have erected it: (1) Probably the classification at the feed end of the tube mill is of insufficient capacity. (2) Probably the compressed air supply is too small. (3) Additional capacity to the Burt filter plant may be found necessary. (4) Probably a large product filter press in the zinc room would be found advisable.

These imply changes to the plant which are not necessarily required at once, nor does their lack interfere with successful operation. The ratio of the capacity of each machine to that of the entire plant may vary with conditions that will arise from time to time. For instance, if any of the four batteries of the stamp mill be hung up for repair, the feed can at once be increased on the conveyor bringing up the slime. The conveyor provided for this purpose was of a much larger capacity than needed for elevating only the proportion of old slime which it was aimed to treat under normal conditions. The fact that a large part of the old accumulation of coarse sand tailings can be cyanided at a profit, will result in their being brought up with the slime as circumstances permit, and this too will vary the conditions under which the classifiers will work. The tube mill is of larger capacity than normal running conditions would require, but it was thought well to install it at once of a size that would grind all the mill tailings, if after the accumulated slime shall all have been cyanided, it should be decided to increase the stamping and concentrating section of the mill to a size to supply tailings up to the capacity of the cyanide plant.

Tungsten in Australia

Special Correspondence

In Queensland the mining for tungsten and molybdenite commanded a good deal of attention in 1911 but the output was not so large as in the preceding year. The chief center of operations is Wolfram camp in the Chillagoe mineral district, where wolfram occurs associated with bismuth and molybdenite. In New South Wales the mining for scheelite has been fairly active in the Hillgrove district, while the production of wolfram-bismuth concentrates from the Torrington district has been on an increased scale. Both from Victoria and Tasmania wolfram in small quantity is also obtained.

Suggestions to Mining Students

William R. Cox, who is well known as a successful mining engineer, in an address to the students of the School of Mines and Metallurgy, of the University of Missouri, at Rolla, Mo., on Oct. 24, 1911, under the title of "Some Suggestions to Mining Students," gave the following excellent advice, which the JOURNAL has pleasure in endorsing in all particulars:

The problem confronting every engineer when he finishes the work required by his college may be formulated something like this:

Given my individual talents, such as they may be, and the training which I have received, what must I do to make the most of them in the long run? How may I develop myself, first, most thoroughly; second, most rapidly to the limit of my capabilities, and convert that development into confidence in myself, the respect of professional friends and the practical benefit of a successful career? Many difficulties and some failures will be avoided if every one of you will ponder well this first practical matter, the importance of which will be brought home to you forcibly when I tell you that with all the hundreds of graduates turned out annually by engineering schools, every active operator is put to it continually to supply his need of competent, practical, young engineers. This statement you can verify for yourselves. It means that a large proportion of technical graduates do not develop as they should practically; principally because they do not know how to carry forward their education from the point at which the school drops it.

This scarcity of competent men spells opportunity for those young engineers who have the wisdom and earnestness systematically to prepare themselves practically as well as technically to fill the demand which never fails. Be certain that many operators are searching diligently at all times for the right men, and when someone tells you that your profession is overdone, remind him of Webster's remark about "room at the top." All important progressive operators, individual and corporate, have long since agreed that technical men are the best timber for development into managers and directors of large mining enterprises, and it is your responsibility to fit yourselves for the demand always existing for competent service.

Many graduates make the mistake of seeking at once work of responsibility, calling for experience and expert judgment, which they cannot in the nature of things possess. It is a serious misfortune for the young engineer and for his unwise employer when such a man is called to report upon prospects or mines or to recommend their development, equipment, method of operation, with valuations, estimates of working costs, profits and other data of similar character. The trained engineer with years of practical experience has difficulty in avoiding the mistakes, errors of judgment, and other pitfalls awaiting those who must do this kind of work. Do not court half successes or certain failures in permitting a desire for too rapid advancement to crowd you into undertakings for which you are professionally immature.

Avoid all short cuts which seem to promise success and reputation; set your feet steadfastly in the same logical road which attains the summit of the hill when you have climbed honestly and bravely with no attempt at running around the easy contours.

Now as to hill climbing:

I advise you every one to devote a number of years, more or less according to your aptness and your opportunities, to manual labor in every department of assaying, surveying, drafting, office and accounting, underground work, milling and construction. You will earn at least as much in practical work during this period as you would in minor technical positions, and you will come out with a grasp of your business which no man achieves who lacks the persistent courage to carry him through this invaluable apprenticeship. Much of this work and of the conditions surrounding it will be hard, rough and disagreeable; nearly impossible to men accustomed to luxury and soft living, but we cannot discuss the business of mining from a "pink-tea" viewpoint. With the preparation suggested you will be competent for the management of a modest property or for a position of limited authority and responsibility on a large one, and your steady advancement will depend upon your personal capacity and opportunities. You will know your business, and that is the main point after all.

Be careful and methodical in keeping the notes given you in lectures and classes. This work is entirely neglected by a large percentage of students, with the result that much valuable time is lost when you are put to the practical test of gathering information in the field. My advice is to begin early in your college work a systematic method of compiling useful data. A diary supplemented with kodak pictures of plants, appliances, drawings and constructional work will be of assistance all through your professional life.

The Yellow Jacket Mine, Idaho

By G. L. Sheldon*

Reminiscences of an isolated mine, first opened about 1860: some of the obstacles encountered and the ingenious methods used in surmounting them.

*Box 135, Ely, Nev.

The Yellow Jacket mine is situated in Lemhi County, Idaho. It was formerly reached from Ketchum, Idaho, the terminus of the Shoshone branch of the Oregon Short Line, by a wagon road 80 miles to Challis, and from there 60 miles by trail over three ranges 9000 and 10,000 ft. high; or from Red Rock, Mont., 90 miles by wagon road to Leesburg, by way of Salmon City, and from there 40 miles by trail over one divide to the mine. In recent years the railroad has been extended to Salmon City.

Discovered in 1860

The mine was discovered about 1860. A few years later it was acquired by J. B. Haggin, who, in 1866, put up a 10-stamp amalgamation mill. This was abandoned after operating a few years on the rich surface ores. In the 80's it was taken over by Morrison & Stein Brothers, who operated it intermittently until 1892, on the best ores obtainable by gophering methods. It was sold in 1892 to Colorado people, and I took possession in October of that year. The former owners, after spending two weeks cleaning up, turned it over to us, and we cleaned up $3000 in four days. The former owners were not practical men, the machinery in many places being repaired with baling wire.

The mine is situated on the side of a mountain, 1200 ft. above the mill. As it cost $2.60 per ton to haul the ore from mine to mill, a distance of two miles, it was deemed advisable to put in an aërial tramway. When the apparatus reached Challis, not a packer in the country would contract the delivery. The company therefore purchased a pack train and did the hauling on company account. The cable was coiled in a long, wide coil, several strands on a side, securely tied together, the mules placed in the center, the cable being lashed to each side on the *aparejos*. The double ends were so stiff that the loop extended in place beyond the head of the mule. It required a man to each mule and two for some of them for the first few days. We had a "picnic" with those mules until they became used to the load and conditions.

When a mule passed over a small elevation he had to carry most of the load of the mule ahead and behind; when passing a depression he was sometimes lifted entirely off his feet. About 20 mules were used for each piece. The trail in many places was extremely crooked and since the cable would not bend to these a new trail was cut out and the train sent straight up or down the mountain. At one place a wall-eyed mule had to take too much of the load. He bucked and threw the whole train down the hill 150 ft. into the timber. This so tangled up the cable and mules that it took a day and a half to cut the trees and get the mules and cable out; but no material damage was done. The cost of delivering the ore from mine to mill, when the tram was finally erected, was reduced from $2.50 to 7c. a ton, the difference soon paying for all costs.

One mule packed a new cam shaft to the mine from Challis. A frame was made so that the shaft rested in the center on top and distributed the weight evenly on the *aparejo*. An extra mule packed along two tripods of the same height as the shaft when loaded. Every two or three hours the shaft was shifted back on the tripods and the mule allowed to rest. It cost 10c. per lb. freight from Challis.

Difficult Traveling in Winter

The trip to or from the mine in the winter was not a desirable one. From the top of the hill above Ketchum the stage at that season was a long toboggan, only large enough for the mail sacks, driver and one passenger. Small pine poles 20 to 30 ft. high, every 100 to 200 ft. marked the line of the toboggan road. If the horses were kept in the beaten track, good time was made and it was not a hard trip.

In the spring of the year, when it commenced to thaw, the roadbed being hard and narrow, and 10 to 15 ft. above the surrounding country, traveling was much more difficult. Six or seven miles below Challis the road left the Salmon River, when snowshoes had to be used. The company had four cabins at equal distances apart, with provisions stored in them, and it was necessary to make a cabin each night. The two guides would glide down the hills and mountains and up the other slope on their skis. Afterward we, too, learned to use the skis and found it much easier. By wrapping a burlap sack around the ski and zigzagging up the mountain, one can climb as fast as with snowshoes.

In the following May, before the trails opened up, the camp became short of provisions from the fact that they were bought for 50 men, and many more were worked. Twelve hundred dollars were spent in shoveling out the trail to get supplies, but before the pack train reached the divide, a chinook wind came and melted the snow in two days.

The mill was run by water power from Yellow Jacket Creek, under a 41-ft. head, Leffel turbine wheels being used. An open ditch 1500 ft. long was used, and a great deal of trouble was experienced in the spring from the slush formed by alternate freezing and thawing. It was therefore deemed advisable to put in a tight, covered flume the entire length. The dam at the intake was enlarged and the gate was made to deliver the water to the flume at 10 ft. depth, thus avoiding all anchor ice.

Mill Destroyed by Fire

On the day the flume was to be completed, the mill man was instructed to put new shoes and dies on the stamps. Hardwood wedges were used and the pieces and shavings from these were burned in the heating stove just below the battery floor. A spark from this stove set fire to the roof of the mill which was exceedingly dry, and the mill was entirely destroyed. By turning water into the flume, the penstock and flume were saved.

In August, 1894, a new sawmill was received, and we commenced sawing lumber for the new mill. Logs were obtained from the neighboring mountains 1 to 2½ miles distant and 1000 to 1500 ft. above the mill. In order that the sawmill should be on a level with the upper part of the new mill, so that lumber, lagging, etc., could be delivered on that level to the tramway and thus sent to the mine, the sawmill had to be placed about 100 ft. to one side of the mill, on a side hill, and nearly 100 ft. above the shafting in the penstock, which was in one corner of the new mill site. The main shafting in the sawmill was connected to the shaft in the penstock by ½-in. wire cable, and we were able to cut on an average of 10,000 ft. per day.

The rubber linings used in the sheave wheels carrying the cable wore out during the winter. It would have required 20 days to obtain new ones. As a makeshift manila rope was unraveled, wound in the sheave wheel, and pine pitch, gathered on the mountainside, melted and poured on it. This made a better lining than the rubber and did not slip.

Mill Rebuilt

The plans and specifications for the new 30-stamp mill were received in October, 1894. The excavations for the foundations were largely in dirt and

gravel. This material was sent down hill in troughs aided by water from a storage tank formerly used to supply the battery of the old mill. Riffles were placed in the lower boxes, and a substantial saving of placer gold was made. All machinery came from Fraser & Chalmers, Chicago, and every box was found to contain exactly what the bill of lading called for.

Three hundred mules were used on the trail packing machinery. The freight was 6½c. per lb. from factory to mill. All shafting was hammered steel, which cost 1c. per lb. more, but resulted in a saving in freight. The mill was double boarded, lined with building paper between and weather strips over the cracks on the outside. It was heated by steam throughout. By working 18 to 20 hr. per day, we were able to drop the stamps within 106 days from the day the specifications were received.

Ore Lost at Shallow Depth

The ore was mostly a fine red, decomposed quartz, together with boulders of white quartz from a few inches to 10 ft. in diameter. On top of the ridge the vein cut off entirely at the 150-ft. depth. Below the ridge the hill dropped off sharply for 100 ft., then flattened out for nearly 1000 ft. The orebody was from 200 to 300 ft. wide and 40 to 80 ft. thick. About 600 to 800 ft. west of the ridge, down the hill, was a large body of white bull quartz left by previous managements 40 to 50 ft. wide, running nearly parallel with the vein, found on the ridge. Some crosscuts were run through this, and it was found to average from $8 to $9. A tunnel 200 ft. vertically lower on a line with the tramway was started into the hill to cut this ore in depth, but the property changed hands before the vein was reached. The new management never found ore on that level.

The new management decided to increase the mill, notwithstanding the fact that the previous consulting engineer and manager advised the development of more ore first. The capacity of the mill was doubled; a new pipeline was put in, in order to get sufficient power; and another tramway installed. The wagon road to the mill had been completed previously. The improvements cost $72,000 and only $68,000 was taken out before the ore was exhausted, and operations ceased.

The country rock is porphyry, probably an andesite, much broken and fractured. The miners call it "block porphyry." It scarcely seems possible that a vein of this size and strength should peter out at such a moderate depth. It is believed that if studied by a competent geologist, it might be found that the vein was faulted, and could be picked up again and worked at a profit.

During the first management of the old mill the average value of ore saved was about $9 per ton; the tailings averaging less than $1 with the old mill, and 50c. with the new. The plate surface was more than double that generally used, and in addition pieces were used the entire length of the launders. Vanners were tried on the tailings in the new mill, but could not make expenses. The bullion was sent out in bars, just under 4 lb., by registered mail, to the New York office, without loss.

Two company boarding houses were run, at which a charge of $1 per day was made. Under the first management the operating cost of this venture was 98c. each per day, but by buying in quantities, this was reduced to 68c. per day. Supplies of all kinds had to be put in for eight months. There was no other settlement within 60 miles, and the manager, besides being a mine and mill man, had also to be something of a doctor and lawyer. One winter there were 24 cases of pneumonia and only one was lost.

[Active operation of the property was resumed by the Yellow Jacket Gold Mining Company under new management, after a careful consideration of reports by E. E. Chase, E. B. Kirby, T. A. Rickard, F. D. Howe and John B. Hastings. We are informed by an officer of the company that at the time these engineers examined the mine, the old workings were either badly caved or were tightly timbered, so detailed study of underground conditions was impossible. The surface of the hill is overlain by a heavy coating of drift, and the difficulty of adequate examination was great. The results of exploration, as reported by the company, are summarized in the following statement: It remained for Mr. Hastings, the present manager, to disclose the actual conditions by proving a north-south fault, which coincides with the lowermost limits of early stoping operations. Mr. Hastings at once bent his efforts toward the location of the vein across this fault and actually entered the vein on a lower level, only to find it again displaced by a diagonal gabbro dike not previously disclosed. All work by the present company has been and still is directed toward opening the vein below the fault and dike. Over the ridge from the mine workings, float from this vein or a similar one is found in quantity, strongly indicating the linear continuity of the ore. Though much might be learned from prospecting in this direction, this course has not been adopted, as the depth of overburden would necessitate tunneling rather than trenching, and, furthermore, expensive equipment would be necessary to bring any ores opened there to the mill. At the main workings, everything is in readiness for production immediately upon the finding of the displaced oreshoot, the 60-stamp mill, ditches, flumes and all machinery having been kept constantly in repair.—Editor.]

Beneficiating Lake Iron Ores

By Dwight E. Woodbridge*

During 1911 some important improvements were made in plants at iron mines in the Lake Superior district.

First in tonnage and results is the great concentrator of the Oliver Iron Mining Co., on the Mesabi range. It is true that this is not essentially a matter of the last year, for experiments looking to the washing of these lean Mesabi ores have been in progress for six years, and two units of the works were operated a short time in 1910. For a period of about 160 days' total working time, in the last year, the work has been in full operation with the five units, with a production of nearly 1,900,000 tons of merchantable concentrates, or 2000 tons above the rated capacity of 10,000 tons per day. This is an admirable result, and one that shows that experiments preliminary to construction must have been most thorough. It is understood that costs of this separation of sand from the west Mesabi ores have been satisfactory, and well within expectations, and there is little doubt that, should an extension of this operation be desirable, the new works would be along somewhat similar lines. This plant has treated ore from a number of mines on the Mesabi, all operated by the Oliver company. It was built primarily for use in connection with the ores of the Canisteo lease, but those from several other mines have been treated the last year, particularly from the Walker, Hill and Holman, two of which are Great Northern leases. In passing, it may be remarked that the capacity of this plant is several times that of any other iron-ore concentrating plant in the world.

The Hawkins mine, belonging to the International Harvester Co., contains a large tonnage of similar sandy ores, and works of the same type are underway there now, to be ready for operation the coming season. This installation differs from the Coleraine plant in but one essential detail, which is that concentration is not to be carried quite so far, for there will be no tables for treating the fines. This new plant will have a 20-hour capacity for 2000 tons of product.

Magnetic Separation

At Moose Mountain, in the Georgian Bay region, are vast deposits of magnetite of from 35 to 40 per cent. iron, with a silica-hornblende-feldspar gangue, and of schistose nature. Here a wet magnetic separator plant of 800 tons daily capacity in concentrates is under construction, using the Grondal patents. This plant is modeled after that at Sydvaranger, Lapland, which has been fully described in the Journal. The

*Mining engineer, Sellwood Building, Duluth, Minn.

works will cost about $250,000 and are expected to produce a brick of 60 per cent. or better, low in phosphorus and of excellent furnace texture. The product to come from this plant the present year will be trifling, as but a part will be ready before late in the season. The Moose Mountain company estimates above 100,000,000 tons of ore upon its property that can be made merchantable. The cost of separation is expected to be under $2 per ton.

Calcining Siderite Ore

Still more interesting are the works under construction at the Magpie mine, Michipicoten district, by the Lake Superior Corporation. Siderite rocks occur frequently in this region, and the Magpie is a mass of concentrated siderite, carrying, say, 35 to 40 per cent. iron and 18 to 20 per cent. carbon dioxide. The located claims there, of which the Corporation has bought seven for $250,000, contain a tonnage of this rock available for calcination that may amount to 40,000,000 or more tons. Elsewhere in the same region is much more. As the result of experiments in the roasting of this rock to drive off the CO_2 a plant is being erected sufficient to treat 1500 or more tons per day, and it is to be in operation by the opening of navigation the coming spring. The material carries sulphur to excess in the form of pyrite, most of which is driven off at the high temperature maintained in the roasters by means of producer gas. The product is a porous bessemer hematite, running about 57 per cent. iron and basic in nature, and will be made at a cost of about 40c. If this process is a success, and there seems little reason to doubt that, it relieves that company of further anxiety over ore supplies for its works at Sault Ste. Marie.

During the last summer a cave-in above the 700-ft. level of the same company's Helen mine brought down about 350,000 tons of ore. As this mine contains a considerable amount of pyritic sand concentrated in pipes and pockets throughout the deposit, the cave-in resulted disastrously, in that it intimately commingled the ore and pyrite. For this reason a washing plant has been installed at the Helen mine for the purpose of eliminating the sulphur, and ore shipped of late has been passed through this washery. Though this operation is perhaps temporary, it is an installation of ore-treatment works on Lake Superior.

Drying Ore

Experiments in drying ore for the purpose of securing a reduction in freights and a lesser one in furnace treatment, were carried along for some months and have resulted in the erection of a drier plant at the Hollister mine, Crystal Falls district, Michigan. Hollister ore assays about 49% iron, nat., is high silica, low alumina and above the average in hygroscopic moisture, of which it has about 13 to 14 per cent. A drier of the Atlas, horizontal rotating type, with capacity for 300 tons per 20 hours, has been in successful operation there during a part of the last year. The drawbacks to successful operation of such works, some of which readily suggest themselves to the critic, are said to have been met, and are classed as easily surmountable. Indeed, the figures seem to prove them less serious than a casual consideration would indicate. For instance, readmission of moisture into the partially dried ore while *en route*, by rains, from atmospheric absorption and the like, will affect merely the exposed portions of the mass of ore, and then only to the extent of the amount of fall or the percentage of atmospheric saturation limited by the exposed area. In ore in cars or pockets this does not mean much. Hollister ore has been brought down to 6 or 7 per cent. moisture and the guarantees for this ore for 1911 present a marked contrast to those for prior years. It is now proposed to extend this drying process to an ore more difficult of treatment. Works to consist at once of two units, each of 40 tons per hour capacity, are under construction at the Brunt mine, Mesabi range. Brunt ore assays 47 per cent. iron, nat., 5.7 per cent. silica, 5 per cent. alumina and more than 15 per cent. hygroscopic moisture, being, as will be seen, quite clayey and wet. The works under construction will dry 1600 tons per 20 hours. If successful as predicted this capacity will be doubled.

Briquetting Fines

At the mine of the Northwestern Iron company, at Mayville, Wis., a Grondal briquetting plant for fines has been built and is now in operation. The Mayville ores contain a large proportion of fines that have caused much loss in furnaces, and it has been the practice to wet these ores thoroughly before charging them, so that they would stay until thickened or covered. A Grondal plant of four ovens, capacity 400 tons per 24 hours, is now working on these ores. In this plant the kilns consist of long channel furnaces, through which the shaped bricks pass slowly on flat cars. These cars form a continuous, intermittently moving platform dividing each kiln into an upper and a lower compartment. Through the lower one cold air is drawn to protect the trucks from heat; along the upper one and down through the bricks and platforms oil flames pass, agglutinizing the bricks, with an extreme temperature of 2400 deg. F. The bricks are made in a near-by pressing plant.

The plant at Port Arthur, Ont., for the elimination of sulphur from Atikokan ores by roasting with waste furnace gas, has been in operation for a year or two. The ore is crushed coarse and roasted with a heat that drives off most of the sulphur carried in the form of pyrite, etc.

Jones' Step Process Experiments

In addition to all these devices the Jones Step Process Co. has been continuing its experiments in enriching and nodulizing low-grade siliceous ores, at its Iron Mountain headquarters, and will soon open a furnace at the Kloman mine, where there are large quantities of lean, siliceous banded ores.

The significance of all these efforts to enrich otherwise valueless ferruginous material in the Lake Superior region or to improve already merchantable ores so as to effect a material saving in freights and final treatments, should not be minimized. That it has crystallized in a year of low prices and dull business in the ore trade is not so astonishing as it might appear at first glance, and is deeply significant of the attitude of the ore trade toward the future. In time of peace prepare for war, is no less a political than a commercial axiom. This work is doing much to bring into the column of available reserves ores that, up to the immediate present, have been classed as future low-grade reserves or that have not been considered at all.

American Institute of Mining Engineers

Notice is given that the annual meeting of the Institute will be held at the headquarters in New York, Feb. 19, 20 and 21. Local committees have been organized, and a detailed program will be issued later.

At this meeting the important amendments to the constitution, which were proposed at the adjourned annual business meeting in 1911, will be submitted to vote. A summary of these amendments was published in the Journal of Sept. 16, 1911, p. 531, and are embraced under three general heads: (1) Change of name of the Institute; (2) Reclassification of membership; (3) Redistribution of dues. In order that the vote on these amendments may be as full as possible, members who cannot attend the meeting are asked to send their proxies to E. E. Olcott and George W. Maynard, specifying how their votes shall be cast. This meeting will probably have an important bearing on the future of the Institute and it is hoped that there will be a large attendance.

It is the purpose hereafter to make the annual meeting the most important gathering of the year, both professionally and socially.

First Aid to Mining Machinery—VI

By Henry M. Lane*

In making molds for hopper castings, simple patterns cannot be used as the mold would be damaged in drawing the pattern. Skeleton patterns for such work are described; also the making of dry-sand molds.

*Editor, Castings, Caxton Building, Cleveland, Ohio.

In many cases a heavy casting may be so broken or of such shape that it cannot be used as a pattern in making a new part, or, when a new casting of fairly intricate form is required, it may be difficult and expensive to make a solid wooden pattern for it. In such cases skeleton patterns may be used to advantage.

Pattern for Circular Hopper

In order to illustrate the principle of the use of skeleton patterns, the method of preparing a mold for the casting shown in Fig. 1 will be described. The figure represents one section of a circular hopper, the hopper itself being 5 ft. 6 in. in diameter at the top, and the hopper part having an angle of 45°. It will be noticed that the metal is 1½ in. thick, and that it is supported by a series of ribs, the ribs at the end of each section serving also as bolting flanges.

sawed out to approximate form and then completed with a draw shave or chisels.

Molding with Strikes

After the skeleton pattern is placed together, as shown in Fig. 2, molding proceeds as illustrated in Figs. 3 and 5. The foundry work is being done a flask of this kind is always a good thing to have on hand, as different bars can be introduced to suit different classes of work. The bottom of the bars, of course, will be cut out so as just to clear the pattern and support the sand properly. The bolted bars can be changed more easily than nailed bars, for where nailed bars are taken out they are frequently broken so that they cannot be used again.

Making the Mold

As already stated, the cope is placed in position and is rammed up in the usual manner. Parting sand has already been placed on the face of the drag so that the cope may be lifted off freely. The cope is then lifted off and set to one side. The drag is finished by taking the strikes shown in Fig. 2 and digging or striking out the sand between the ribs in the

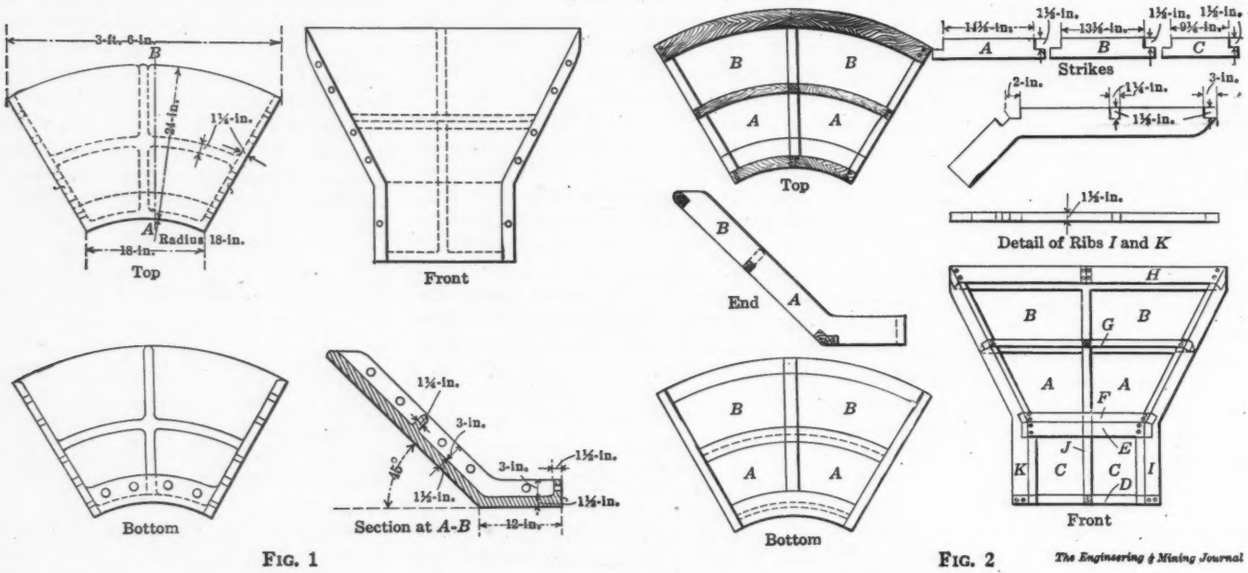


FIG. 1 FIG. 2 The Engineering & Mining Journal

CIRCULAR CAST-IRON HOPPER AND PATTERNS FOR MOLDING IT

Four views of the casting are given in Fig. 1. The pattern for making this casting is shown in Fig. 2; it consists simply of the ribs, flanges and a few tie strips.

The opening in the mold which is to be filled by the metal which will form the face of the casting in the areas represented by the openings *A*, *B* and *C*, is formed by striking out the sand with the strikes *A*, *B* and *C*, corresponding to the similarly lettered areas. Three ribs are made, as shown in detail, and these are then connected with circular segments which are worked out to form and attached as shown. The lower flange *D* is, of course, sawed from plank. In like manner the segment *E* is sawed from plank. The segments *F*, *G* and *H* are drag part of the flask, shown in the illustration, is made of channel irons and is rammed full of sand and the pattern bedded in, as shown in Fig. 3. The sand is filled up even with the top of the pattern, so as to form a parting along the upper face of the pattern. The cope flask is then placed in position, as shown in Fig. 3. This cope flask is constructed as shown in Fig. 4, being made up of channel irons with wooden bars for supporting the sand. These bars may be attached by bolting them to angle irons, as illustrated, or holes may be drilled in the side of the flask and the bars nailed in place.

The angle-iron method makes a stiffer flask, but at the same time one that is considerably more expensive. If much spaces *A*, *B* and *C*, Fig. 2, as illustrated in Fig. 5. The ends of the strike ride on the ribs and the lower portion serves to cut out the sand between the ribs. After this has been done the screws holding the segments *D*, *E*, *F*, *G* and *H* are removed, and the segments, with the exception of *D*, lifted out. The flanges *I* and *K* are then drawn from the sand separately. After this the flange *D* is drawn from the sand. This releases the flange *J*, which is drawn last. The flange *D* could not be drawn until *I* and *K* are out of the way, as there would not be clearance for the end of the flange *D*. In like manner flange *J* cannot be drawn until the two portions of *D* have been removed, on account of the fact that *D* passes over the top of *J*. It will readily be seen that

this pattern could not be drawn from the sand in one piece if it were molded with the inside face up.

An Alternate Method of Molding

The pattern can be molded with the inside face down. In this case the striking out of the sand between the ribs is a little more difficult, as the projecting ribs are in the way. If the pattern were molded with the inside face down, the parting would extend from the edge of the flask to the top of the ribs *I* and *K*, and the sand between these ribs and the rib *J* would have to be lifted out with the cope. As it is difficult to lift out such hanging bodies of sand, the method already described would be easier for those not particularly skilled in the art of molding. After the various parts of the pattern have been withdrawn, any broken corners are patched, and if a simple green-sand casting is required the gate is cut, the mold closed and poured.

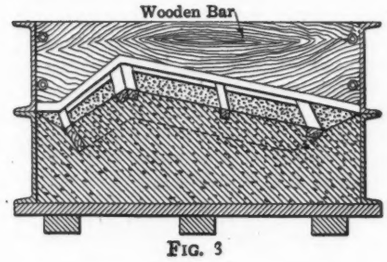


Fig. 3

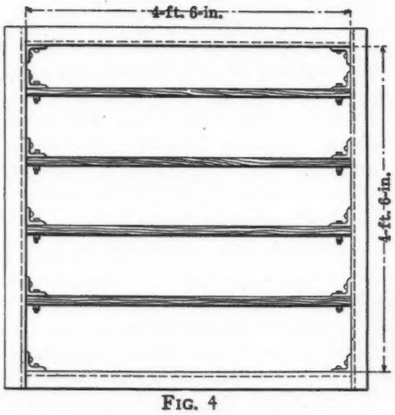


Fig. 4

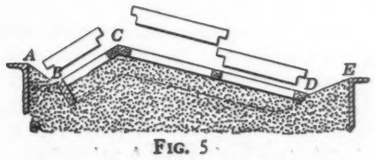


Fig. 5

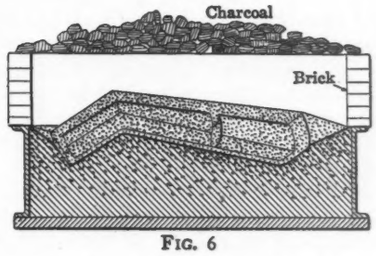


Fig. 6

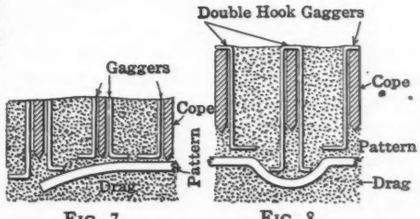


Fig. 7

Fig. 8

The Engineering & Mining Journal

Molding with Sweeps, Showing Use of Gaggers

In heavy work the large body of metal retains heat much longer than a thin casting, and hence there is a tendency for the sand on the surface of the casting to be burnt or partly melted, so as to stick to the casting. To reduce this to a minimum, facing or blacking is frequently employed to peel the casting. The regular foundry-supply houses furnish plumbago, coke or soapstone facings for this purpose. In emergency foundries, blacking made from coke fine enough to pass at least a 100-mesh sieve and preferably a 200-mesh sieve, may be used. If a good grade of talc is available, some of this may be ground with the coke. The coke should then be mixed with a little clay wash and glutrin water or molasses water to the consistency of a thin cream. This is placed on the face of the mold by means of a swab or spray. The usual method employed by the foundryman for spraying is to take a large, soft brush with bristles four or five inches long, dip it into the mixture and then, by a quick jerk, throw the liquid on to the face of the mold as a spray of fairly fine drops. Another method is to use a swab made of wicking, which is dipped in the facing and then dragged over the surface of the mold. Care must be taken not to wash away the sharp corners of the work; hence the spraying method is usually better than the swabbing, though in the hands of a skillful man the swab may be used without breaking corners.

Method of Drying the Mold

The corners, if slightly damaged, can be patched with the trowel after the wet facing has been applied. After applying the wet facing the surface of the mold must be skin-dried. This is accomplished in the case of the drag by placing some bricks around the edge of the flask, as shown in Fig. 6, laying some sheets of corrugated iron or ordinary sheet iron across the top of the bricks and building a charcoal fire on top of the sheet iron. The heat from this fire will be radiated down on top of the mold and will dry it. In piling the bricks on top of the flask, a sufficient number of loose joints should be provided to permit the escape of the steam which results from the drying of the wet blacking or facing. The cope is dried by setting it up on four standards, placing some sheets of iron around the outside face and building a charcoal fire under it. It is necessary to dry only the surface for a depth of from 1½ to 2 inches.

Preferably the drying should be done just before pouring the mold. The mold should be closed hot and poured as soon as possible. When making skin-dried molds, a stronger grade of molding sand may be employed than when making green-sand molds, that is, the sand may contain more clay. Frequently in this class of work some very coarse sand or small gravel is worked into the mixture as the foundryman says, to strengthen it, though it probably also acts in opening the vents. For skin-dried molds the sand may be rammed a little harder than for green sand, because the drying removes the moisture from the surface and so gives a freer vent next to the face of the casting.

A Third Method

The casting described in this article could also be made in an all dry-sand mold. If this were the case, however, the wooden bars in the flask shown in Fig. 4 would have to be replaced by cast-iron bars bolted in place. These bars can be made in open sand molds, that is, cast in the floor without any cover over them. Each of the bars, of course, will have to be formed along the lower edge to fit the pattern. Where dry-sand work is to be made, a much heavier or stronger sand is used than for green-sand or skin-dried work. This sand should contain a considerable proportion of clay and should be rammed as hard as the molder can ram it.

Dry-sand molds are more nearly foolproof than green-sand molds. This is because there are not so many difficulties resulting from the venting, since in a dry-sand mold all of the moisture has been removed before the metal is cast. This has a double effect; first, there is no moisture present to be driven out as steam during casting, and, second, what vent there is back of the face of the mold is not clogged by moisture serving as a bonding medium.

Fair dry-sand molds may be made by taking the ordinary green molding sand and wetting it down with glutrin water and clay wash. This can be made by putting one or two shovelfuls of fireclay into a barrel of water, adding from one to two gallons of glutrin, stirring it up thoroughly, and then sprinkling the sand with it. The sand is then cut over several times with the shovel to mix it thoroughly and after this it is rammed into the molds "good and hard." After the molds have been rammed and the pattern drawn they are placed in a core oven and thoroughly dried. This drying should preferably take place at a temperature not exceeding 350° F., and should proceed slowly so that the moisture may pass

from the sand without having any tendency to disturb its surface. If the mixture contains sufficient silica, it will not crack seriously during the drying.

Binders Used in Dry-sand Molding

In making dry-sand molds it is always necessary to use a large number of rods or gaggers to tie or bind the sand together, and these are dipped in clay wash and placed next the bars in the cope. The drag, of course, does not need bars, on account of the fact that it is not turned over during any stage of the molding operations. The strongest gaggers are made from twisted bars such as are used for reënforced concrete work. This form of gagger was patented by the Franklin Core Rod & Gagger Co., of Franklin, Penn. For ordinary work, however, round or square wrought-iron rods from one-quarter to half an inch in diameter or cast-iron gaggers a half inch in diameter are used. The method of placing the gaggers next to the bars is shown in Fig. 7. The foundryman calls a piece of iron bent like a letter L a gagger or single-bend gagger. Sometimes the upper end of the gagger is bent back, so that the whole takes the form of the letter *Z*. These double-bend gaggers are not so handy as the single bend, on account of the fact that the length of the straight portion of the shank is governed by the depth of the bars in the flask. The double-bend gagger, however, can support a much heavier load than the single bend, as the single bend is supported solely by the friction of the sand about the straight portion or shank.

Foundrymen sometimes use what they call soldiers to support the sand in the flask. These are narrow strips of wood from one inch or two inches in width and about an eighth of an inch thick. They are dipped in clay wash and placed in the mold in a manner similar to gaggers, except that the stem of the gagger is always placed next to a bar, while soldiers are frequently placed between bars. Soldiers are particularly advantageous in carrying sand in deep pockets, on account of the fact that they do not weigh as much as gaggers, and hence do not aggravate the trouble they are intended to solve by increasing the weight which must be supported.

Facing and Drying Dry-sand Molds

Dry-sand molds should always be washed or blacked on the face. As the mixture used in dry-sand molds is harder and stiffer than that used in green sand, the wet blacking or facing mixture may be applied to the surface of the mold with a brush or swab. Dry-sand molds cannot be dried satisfactorily by charcoal fire on the floor, as this would serve only to skin-dry them.

Where large work has to be made in the emergency foundry, dry-sand or skin-dried molds should always be used, and if facilities are at hand for drying the mold, the all dry-sand mold is to be preferred. Dry-sand molds are sometimes dried by blocking up the flask on its bottom plate on the floor, building up a loose brick wall about it or a structure made of sheet iron, and then building coke or charcoal fires inside of the structure and maintaining the fire for from 24 to 48 hours. In this case the cope may be placed above the drag, the two being separated by piles of brick at the corners and both are dried at the same time. This is virtually making a temporary core oven on the foundry floor and then drying the molds in it. The surface of the casting made in a dry-sand mold, which has been dried with a proper facing mixture, is generally better than that obtained from a green-sand mold.

The Marysvale Alunite Deposit

A deposit of alunite, recently discovered near Marysvale, Utah, according to the press bulletin of the U. S. Geological Survey, may become of commercial importance for the production of potash to supply Western orchards. A vein of pink spar in the hills southwest of Marysvale had long been known to prospectors, and had repeatedly been located for the sake of small showings of metalliferous minerals in the siliceous wall rocks, but its true character was not recognized until 1910, and on Jan. 1, 1911, the deposit was relocated as potash claims.

The deposit is situated near the head of Cottonwood Cañon, about seven miles southwest of Marysvale, in Piute County. It is found high in the Tushar range, outcropping near the crest of a ridge, which leads from the crest of the main divide at an elevation of approximately 11,000 ft. above sea level, and extends down to about 9900 ft., the lower end being about 4000 ft. above the level of the railroad at Marysvale. So far as is now known, the entire deposit is located.

Alunite is a hydrous sulphate of aluminum and potash containing 11% of K_2O. It is generally white in color, though sometimes grayish or reddish. In the United States, alunite occurs at several places in Colorado: in the Rosita Hills, Custer County; on Calico Peak, near Rico; in the National Belle mine, near Silverton; and at Cripple Creek. It also occurs at Tres Cerritos, Mariposa County, Calif.; associated with the gold ores at Goldfield, Nev.; in the Cactus Range, east of Goldfield; at the Rabbit Hole sulphur mines, near Humboldt House, Nev.; at Alunite, near Las Vegas, N. M.; in the Morenci and Bisbee districts, Arizona; and in the Frisco district, Beaver County, Utah.

In some of these places it is supposed to have been produced by the alteration of potash feldspars. If the alterations are the result of descending acid solutions derived from oxidation of pyrite, the resulting deposit will not presumably extend below the surficial zone of oxidation, but if they are due to ascending acid solutions of volcanic or other origin, they may be expected to extend to greater depths.

The deposit at Marysvale appears to be a large regular true-fissure vein, the alunite occurring in bodies both of compact earthy or granular texture, and in clear crystalline masses, varying from white to a clear pink color. The vein strikes northwest, has been traced by prospecting about 3500 ft. along the outcrop and is known to outcrop for about half a mile more. There is in one place at least 20 ft. of solid alunite in one vein and about 6 ft. more in a parallel vein about 25 ft. away.

If the width of the principal vein be taken at 10 ft. and the proved length of the deposit at 3500 ft., then the area of the deposit will be 35,000 sq.ft. Then for each 100 ft. of depth, at 175 lb. per cu.ft. of rock, the deposit would yield 300,000 tons of rock, or about 30,000 tons of potash, or about one-sixth of our annual imports.

Uranium in 1911

An active demand for uranium ores, particularly from European sources, characterized the uranium situation in 1911. At first it was thought that some new and important use for the metal as an alloy or in the chemical industries had been discovered, but later it was practically admitted by the buyers that the ore was wanted for the purpose of the extraction of radium and radio-active salts.

Interest in the carnotite deposits of Colorado and Utah was revived and great activity in shipping and in exploration in this locality resulted during the summer and autumn. It is probable that these deposits will be still more extensively exploited during 1912. The ore contains both uranium and vanadium. About 30 cars of carnotite were shipped, most of it to England but some of it to Pittsburgh.

A small output of pitchblende was made from mines in Gilpin County, Colorado, and discoveries were reported from Chihuahua, Mexico. The chief output of pitchblende continues to be from Germany and Cornwall, England. Reported deposits of complex uranium ore in Guerrero, Mexico, were examined by the Mexican Geological Institute and were reported as not important.

A large deposit of radio-active uranium ore was reported by Douglas Mawson, in Australia, and its development and exploitation were actively begun with some financial pyrotechnics.

Concentration of Molybdenite Ores

By Henry E. Wood*

In the concentration of molybdenite ores flotation methods are used. When the gangue contains other sulphides preliminary or subsequent treatment is necessary. Three types of concentrating machines are described.

*President, The Henry E. Wood Ore Testing Co., Denver, Colo.

Such a vast amount of information on the general subject of flotation has been published that I will eliminate the theoretical side and give, as briefly as possible, an outline of my device for the concentration of molybdenite. Whatever is said about molybdenite applies, in nearly all cases, equally well to the other sulphides, most of which have a strong flotation tendency. I have developed three flotation machines, two of which are already patented both locally and abroad, and patents are pending for the other.

Concentration by Flotation

For type A the molybdenite ore is ground dry to 20 mesh or finer, fed automatically from a vibrating plate, which delivers the ore upon a rapidly moving inclined sheet of water. The molybdenite (MoS_2) floats and quietly passes over the surface of the tank. In falling from the tank the loaded film is split off by means of a nearly vertical screen, as shown by the accompanying cut, and collected by the usual means.

In type B the same method of feed is employed, but the inclined plane of water discharges into a conical tank. In this a vertical movement of the water is obtained by a water jet against the sides. The loaded film is diverted by guiding screens to a funnel, the outlet of which passes through the sides of the tank to a collection launder. This plan collects all of the floating molybdenite, but as it requires some water to carry the film into the funnel, that water contains more or less silica in suspension. The saving in either of these types is good, but the product is more or less contaminated. It was to avoid this feature and meet market requirements that the third machine, known as type C, was designed.

If preliminary tests show that the molybdenite is detached from its gangue at 20, 30 or 40 mesh, it is fed from the hopper to the vibrating plate. From the latter it drops upon a revolving corrugated rubber cylinder. This elevates enough water to saturate the gangue, while the molybdenite floats from the cylinder across the tank to a canvas belt, or series of belts, which emerge from the tank. Before it reaches the take-off belt, water jets just below the surface gently force the film upon the belt. The curve of the belt upon the roller meets the film at a point when the water, with its gangue in suspension, is drained off. The take-off belt is so arranged that the concentrates are deposited in a shallow compartment, from which they float off to settling tanks or to tanks where they are dewatered by filtration. During its passage across the surface of the tank the film passes over one or more partly submerged canvas or screen-covered cylinders, which are revolving at the same speed as the main take-off belt. These cylinders serve the purpose of saturating any gangue that may not have become wetted previously.

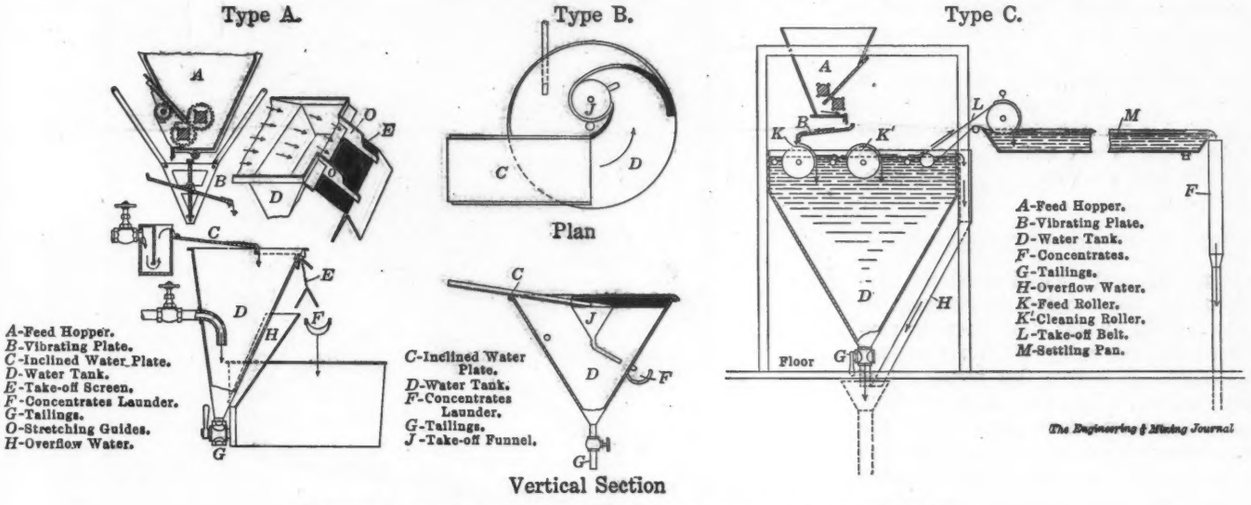
The entire operation is so gently performed that but little of the film is accidentally wetted and sinks. The gangue passes out at the bottom of the tank and is subject to table concentration if it should contain other minerals of value that have not floated. For treating ore coarser than 20 mesh the feed cylinder is removed and an impetus given to the surface of the tank by means of water jets in front of the vibrating plate.

Removal of Other Floating Minerals

So far as the concentration of molybdenite that has a simple gangue is concerned, by the use of type C it is completed at one operation. If copper or iron pyrites and other sulphides are present, as is frequently the case, they float with the molybdenite. I employ one of two methods for their separation: The flotation concentrate is given a light roast and the iron and copper removed by magnetic separation. The simpler plan is to pass the wet flotation concentrate over a Wilfley table, making an iron and copper concentrate, as the molybdenite is readily collected by itself in the tailings.

Where mica is present a small proportion of it also floats. As some of the associated micas are magnetic they are taken out by magnetic separation, leaving the nonmagnetic tailings as a high-grade molybdenite concentrate. I have made many tests on molybdenite ores running from 1% up to 8% or more; and where it is contained in a clean quartz gangue there has been no difficulty in obtaining an 80 to 90% MoS_2 product with a recovery of 80 to 90%. This method is adaptable to either of the two forms of MoS_2.

These concentrators require less than ¼ hp. to operate them, merely enough for feeding purposes. With a clean



DIAGRAMMATIC SECTIONS OF THREE MOLYBDENITE CONCENTRATORS

gangue it is quickly saturated and the concentration completed at one operation. The amount of water required is just enough to carry off the tailings and also what clean water is used in washing the take-off belt. This system of flotation is feasible on account of its simplicity as compared with the various complicated oil and acid flotation processes more widely known, while its operation costs are consequently considerably less.

The present standard machine has a 3-ft. feed with four feet of take-off belt surface. The capacity varies as it is dependent upon several conditions, such as the character of the gangue, the size of the ore treated and the ratio of concentration, the latter feature being affected greatly by the expansion properties of the loaded film. This is extremely elastic, and while it will stand a large amount of compression, care must be exercised to prevent its being overloaded as it is liable to sink from its weight.

The dimensions of the machine can be made to meet almost any practical requirement. The present machine with a 3-ft. feed occupies a floor space of 4x5 ft. and is 6 ft. high. When crated for mule-back transportation its weight is 1300 lb. The net weight is 1000 lb. At present it is manufactured by the Denver Engineering Works and sells f.o.b. Denver for $500 to $600. It is sold without royalty.

Methods of Drying Concentrates

I am frequently asked about the drying of the fine flotation concentrates. It is a mistake in the first place to consider them as being all finely divided sulphides. It is true that nearly all of the fine sulphides are recovered, but along with them a large proportion of the sulphides coarser than 16 mesh will also float, so that the final drying of such concentrates does not differ much from the drying of other concentrates.

Flotation concentrates may be collected by a series of overflow settling tanks, as the concentrates are wetted in collecting them and sink quickly in the clean wash water, practically no gangue in suspension going with them. In continuous operation I use vacuum or pressure filters to dewater them, after which they are dried by the usual means.

As a matter of interest in connection with the concentration of molybdenite ores, I note that there has been little development of the mines. As a consequence the surface or partly oxidized ores will not do as well as the unoxidized ores. This state of affairs may be largely due to the want of a simple method of concentration, such as this new device is able to supply. I also find that in nearly every sample of molybdenite submitted to me considerable molybdic oxide is present. As practically all the oxides are quickly wetted and sink, one can recover only such of the oxidized particles as chance to land on top of the film of the sulphides.

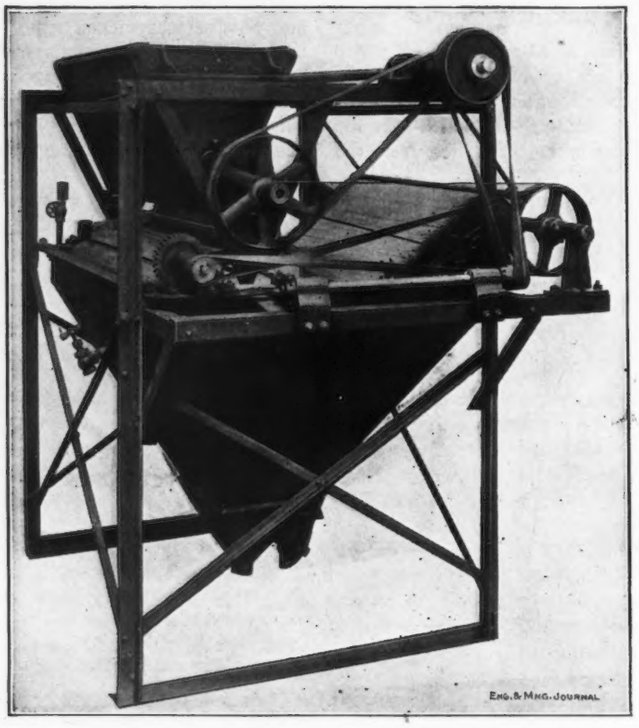
Ore Must Be Crushed Dry

To procure the advantages of surface-tension principles it seems to me that the ore must be crushed dry. My experience has shown that some of the various types of ball mills (for instance, the Krupp) will not only liberate the sulphides in better shape for flotation, but produce at the same time a minimum amount of fines. If the ore is ground finer than necessary it will also float to a certain extent, a condition to be avoided as far as possible.

It happens occasionally that even in the wet crushing of ores there is a large loss of floating sulphides. I have a simple device for the complete recovery of such floating slimes than can be placed in the discharge launder of any mill.

Another interesting fact has been forcibly impressed upon me in conducting over 800 flotation tests. I refer to the rapidity of the oxidation of the sulphides after they have been ground. An ore like chalcopyrite, for instance, which will float to 80 or 90% of its copper contents, if treated reasonably soon after grinding, will not yield half that amount if allowed to stand a week or two after grinding. If ore that has been ground dry and subsequently wetted and dried again be treated by flotation, practically all that had previously floated will sink.

Oxidizing effects that are invisible to the eye have an important bearing on flotation work. I noticed this feature when concentrating a low-grade chalcopyrite associated with a heavy pyrrhotite. When treated by flotation most of the former material will float, while the latter with some copper will sink. If subsequently this latter mixture is dried and treated magnetically, the pyrrhotite is easily lifted, leaving the chalcopyrite as nonmagnetic tailing to be added to the flotation concentrate, and the two together insure a high total recovery. If the chalcopyrite and pyrrhotite concentrate made after flotation is dried and treated by flotation, the copper will also sink. I have also observed that magnetic minerals will sink to a decided extent—such as magnetite, pyrrhotite, magnetic blende, etc., while the yellow blende will float readily under certain conditions. Apparently the flotation conditions for each ore will require investigation to determine just how it should be treated to insure the best results.



Wood Type C Concentrator

Parting Platinum Silver Alloys

The use of sulphuric instead of nitric acid for parting platinum-silver alloys has long been recommended. A. Steinmann, in *Chemisches Centralblatt,* says the use of concentrated sulphuric acid is likewise inaccurate, and recommends the use of slightly diluted acid, the procedure being as follows:

About 250 mg. of the platinum alloy are mixed with silver (at least 5 times the quantity of platinum present), copper and lead, the quantity of copper to equal

that of the platinum. The whole is then cupelled at as high a temperature as possible and the button obtained fused from 5 to 10 min. The resulting button is then rolled to a thickness of 0.2 mm. and heated for 15 min. with dilute sulphuric acid (100 volumes of concentrated acid to 22 volumes of water) at a temperature not exceeding 240° C. The treatment with acid is repeated twice, and residual platinum is washed, dried and weighed.

Wrought Iron Production

By Bradley Stoughton*

The oft-quoted statement that the invention of the Bessemer and openhearth processes would drive the wrought iron industry out of existence has long since ceased to worry the iron manufacturer; nevertheless, the sphere of rolled iron has constantly narrowed, and the actual production in America has been on the decrease since about 20 years ago. The following statistics of the number of puddling furnaces are compiled from data published by the American Iron and Steel Assocation:

Nov., 1887....	4882	April, 1898....	3889
Nov., 1889....	4914	Nov., 1901....	3251
Jan., 1892....	5120	June, 1904....	3161
Jan., 1894....	4715	Nov., 1907....	2635
Jan., 1896....	4408		

The following figures of production of wrought iron are from the same sources.

PRODUCTION OF ROLLED IRON

	Rolled iron, gross tons.	Percentage of total rolled iron and steel.
1888	2,153,263	46.5
1889	2,309,272	44.1
1890	2,518,194	42.8
1904	1,760,084	14.7
1905	2,059,990	12.2
1906	2,186,557	11.2
1907	2,200,086	11.1
1908	1,238,449	10.5
1909	1,709,431	8.7
1910	1,740,156	8.1

It is to be observed that a large proportion—probably from one-half to three-quarters—of this tonnage is made by the busheling and rerolling of wrought iron scrap, and is not the new product of the puddling furnace. This circumstance is especially important because it means the abundant use of an inferior product through a misconception. Busheled scrap almost inevitably contains masses of intermixed steel scrap, which renders the product less able to resist rusting than either wrought iron or steel alone; and yet it is the belief in the superiority of iron to resist rusting that is the chief factor in keeping alive its manufacture today, as evidenced by the circumstance that the field of wrought iron has narrowed more and more to the production of forms that are to be subjected to corrosive influences; namely, roofing sheets, boiler plates and pipes. Whatever one may think of the quality of newly puddled iron in this respect, we believe the unreliability of busheled scrap will not be questioned.

*Consulting engineer, 165 Broadway, New York.

The London Silver Market

Messrs. Pixley & Abell's annual circular says that in 1911 fluctuations in quotations of spot silver were rather smaller than in 1910. The highest quotation of the year was 26⅛d., on Nov. 23, and the lowest 23 11/16d. on Feb. 9, a range of 2 7/16d. against 3 1/16d. in 1910, 1 1/8d. in 1909, 5d. in 1908, and 8¼d. in 1907. The average price of spot silver for 1911 is 24 13/32d., against 24 11/16d. in 1910, 23 11/16d. (the lowest on record) in 1909, 24 13/32d. in 1908, and 30 3/16d. in 1907. On Jan. 1 the quotation was 25¼d.; that of Dec. 30, 25 1/16d. per ounce.

Speculation in Silver

The very large amount of silver under the control of the Indian group of speculators was again a dominating influence on the market throughout the year, which opened with a steady tone. Prices were maintained at about 25¼d., China giving some support to the market until about the middle of January, when an outbreak of plague in Manchuria and Northern China interfered with the export of soya beans and other produce, while at the same time there was a brisk business doing in imports in Shanghai and other China ports. China became a seller on this market, which at once assumed a weak tone, and quotations declined steadily until Feb. 9, when 23 11/16d., the lowest price of the year, was quoted. The Indian bazaars, which had been buying moderately, now began to support the market, there being in some quarters an unfounded apprehension lest the import duty on silver into India should again be increased.

At the same time the plague in Manchuria showed signs of abating, so that the export of beans was resumed on a normal scale. China also became a buyer, and quotations steadily improved to about 24¼d. early in March. From this point until the middle of July fluctuations were small, quotations being steady in the neighborhood of 24½d. with a short-lived upward movement during the latter part of April, which carried the price up to 24 13/16d. At this time it was anticipated that the crops in India would be satisfactory, as the monsoon at the opening had been favorable, but during July a spell of dry weather, which lasted for some weeks, set in, and as the prospect of India securing good average crops became improbable, Indian and other speculators began to sell silver, and the market sagged until 23 11/16d. was touched. From this point it recovered slightly, and remained between 24d. and 24 5/16d. until the outbreak of the rebellion in China in October. A demand for dollars in the interior of China caused large purchases of silver to be made in London and India, which, after being coined into British dollars in the Bombay mint, were sent on to Hong Kong. At about the same time there were satisfactory late rains in India, which greatly improved the prospects of the crops and removed all fear of a famine. This, with the demand from China, lifted the price of spot silver to 25d., at about which figure it remained until early in November.

Finding China a good buyer of spot silver, the Indian speculators, who have been large holders of silver throughout the year, then began to take delivery of their contracts as they came due, and the grip which they had on the market was sharply felt. Those who had sold short found great difficulty in securing the silver necessary to cover their contracts, and as the bear account open in London was undoubtedly very large, there was a further sharp rise, and as high as 26⅛d. was quoted for spot silver, the forward quotation at one time being as much as ¾d. below that of spot. This tempting premium caused some shipments from China to be made to this market, while America sent increased supplies, silver, which in normal times finds its way from San Francisco to China, being diverted to this country. These larger supplies, while consumers as far as possible delayed their purchases, served to relieve the strain, and the premium on spot gradually decreased until the middle of December, when the spot quotation declined to about 25½d., while forward was ⅛d. to 3/16d. lower. During these weeks China had been a moderate buyer of forward silver, but its purchases were never very large. During the third week of December the market sagged further, while at the same time the Indian speculators stopped taking delivery of their contracts with the result that the premium on spot silver rapidly disappeared, and on Dec. 20 was again quoted below forward, as it had been throughout the year, until the squeeze began in November. At this date the quotation had fallen to 25⅛d., supplies of spot silver being more than ample, and the market remained at about this figure to the end of the year, China continuing to buy steadily, though India was selling.

Silver in India

The popularity of silver as an investment in India seems to be waning, as the following figures, published by the Commercial Intelligence Department of the Government of India, indicate. After deducting the amounts reëxported from the amounts imported, it appears that India has retained for home consumption during the year ended Oct. 31 last, 44,000,000 oz., against 56,400,000 oz. during 1910, and 60,843,000 oz. during the year 1909. How far these decreases are to be attributed to the increase in the import duty, which was made last year, and how much to larger investments in gold, is difficult to determine. The poorer classes

probably find it impossible to invest their small savings in anything but silver, but the wealthier classes are possibly finding gold a more convenient and steadier holding than silver. The stock in Bombay, which amounted to 20,000 bars on Jan. 1, 1911, was reduced to 13,400 bars on Oct. 31, and now amounts to 13,200 bars. The prolonged period of dry weather during the summer did great damage to the crops, but fortunately the autumn rains were good and prevented the disaster of a famine. The demand for silver rupees was smaller than in 1910, and the Indian government again made no purchases of silver, while it seems probable that it will not be obliged to buy for coinage this season, though the Burma rice crop has yet to be dealt with. The total holdings of silver rupees in the treasury is now 25¼ crores (at the exchange of 16d. to the rupee equaling £17,166,009), against 32 crores (£21,400,000) at the end of 1910, and 38½ crores (£25,833,000) at the end of 1909. The holdings of silver in the gold standard reserve, which, at the end of 1910, amounted to 3¾ crores, now amount to 3 crores.

Silver in China

The year 1911 was one of disaster and disturbance for China. The plague in Manchuria and North China, the floods in the Yangtse Valley and in Manchuria, which have caused severe damage to the bean crop, and during the closing months of the year the rebellion, which spread over the whole of the Empire, have all been heavy blows to the immediate prosperity of this country. Still China has withstood these buffets of fate better than could have been expected, and has again been an important buyer, while if the negotiations now in progress for the political settlement of the country result in a stable form of government resting on a popular basis, it is very probable that the material prospects of the Empire will steadily improve, and that the awakening of China will be more rapid than could have been deemed possible a few weeks since. A larger field for the use of silver should be opened up, especially if the reform of the currency, which had been commenced, but which has been in abeyance during the rebellion, should be energetically taken in hand by the new government, as is very probable. A large sum of money will be required to carry through this reform of the currency and for this and other purposes a loan of £10,000,000, of which £6,000,000 was to be devoted to currency reform in China, and £2,000,000 to that of Manchuria, had been arranged for with a group of British, French, German and American banks. The negotiations for this loan will, in all probability, be renewed with the new government, as soon as it is firmly established. The Peking government had during the year secured a stock of silver from various sources, which had been coined into dollars as a commencement of the reform, as arranged with the above mentioned foreign powers. These dollars, which are to be the basis of the new currency system of the Empire, are to weigh 414½ grains with a fineness of 0.900. We understand that it had not been intended to issue these new dollars, of which a few specimens have been received here, until a much larger stock had been acquired, and also until all the arrangements for the change had been completed, but the scarcity of currency, owing to the rebellion, forced the government to issue them recently.

Heavy Shipments to India and China

Shipments of silver bars to India and China have amounted to £9,835,000 in value, being an increase of £1,165,000 over the amount shipped last year. No figures are yet available to show how this amount was divided between the two countries. China also received £1,900,000 from San Francisco, against £1,400,000 in 1910, while in March $10,000,000 from Indo-China were sent to Shanghai.

During this year the Bombay mint coined a considerable quantity of British dollars for use in Hong Kong, but no official statement of the amount has as yet been published. Stocks of bar silver and sycee in Shanghai show a remarkable increase during 1911, as, according to the latest figures available, there are now in Shanghai 243 lacs of taels in sycee and 1590 bars with a sterling value of about £3,300,000. There is also a stock of nearly 9,000,000 Mexican dollars. At the beginning of the year the holdings were 123 lacs of taels in sycee and 6370 bars with a value of £2,302,000 in all.

Other Sales

Purchases by Russia and Germany were again important, the former country taking £1,752,647 from London and the latter £1,725,335, against £1,110,000 and £1,257,780, respectively, in 1910. Shipments to France were £940,283, and to Brazil £216,136, against £533,740 and £53,000 in 1910. British silver coin to the value of £1,751,896, of which £1,069,652 has gone to West Africa, has been exported, against £1,406,500 in the preceding year. The world's production of silver seems to be maintained.

The total value of the imports of silver bars into Great Britain during 1910 amounts to £13,948,960, against £12,660,000 in 1910. In addition, silver ores valued at £1,700,000 were imported, while in 1910 the value of these was £1,862,333 in all.

At the close of 1911 the stock of silver in London is estimated to amount to £1,900,000, while at the beginning of the year it was about £2,000,000, which was probably considerably underestimated.

Famatina Development Corporation

The report of the Famatina Development Corporation, Ltd., for the year ended Dec. 31, 1910, was recently issued. The ores reserves at its mines in Argentine, South America, on Dec. 31, 1910, are reported as 188,570 metric tons. In 1910, 1467 ft. of development work were done, which is comparatively small. About 13,267 metric tons of ore were mined; 11,237 metric tons were smelted from which 392,434 kg. of copper, 3976 oz. of gold, and 72,221 oz. of silver were obtained.

In February, the government aërial tramway by which the ore is transported from mine to smeltery broke, and was not repaired until September. This long interval interfered seriously with the operation of the smeltery. The enforced stoppage was utilized in the installation of a Brown mechanical roasting furnace and a Yeagon briquetting plant. A steam plant of 350 hp. was also purchased and put into operation in January, 1911. This is a necessary addition owing to the fact that the floods of the summer season bring down so much sand and gravel as to interfere seriously with the water power plant, and also with the supply of water clean enough to use in the water jackets and in the boilers.

At Durazno heap roasting is to be employed, as the Brown roaster alone is not capable of treating sufficient ore to supply two furnaces with roasted material. At the roast heaps, pits have been made so that the copper sulphate leached out by heavy rains can be precipitated by scrap iron.

The fine flue dust and the roasted ore from the Brown furance are briquetted with lime as a binder. A proper means of drying briquets is necessary because, undried, they are too friable to withstand direct charging. Thirty cars on which the briquets can be piled as they leave the machine are ordered, and will be of much assistance; if these are satisfactory, additional cars will be ordered. In November, 1911, a contract was concluded with the Argentine government, which should effect a saving to the company of £23,800 per year in the matter of transportation.

The Tasmanian Metal Extraction Company was to have commenced (*Min. Journ.*, Oct. 28, 1911) operation of its bi-sulphite plant late in 1911. The Tasmanian Copper Company has contracted to dispose of all its ore, composed of sulphides of auriferous and argentiferous lead, zinc and copper, to this company. With the bi-sulphite process it is hoped to save the zinc formerly lost, as well as the other metals in the ore.

Mining and Metallurgical Patents

A Classified List of New Inventions

A copy of the specifications of any of these patents issued by the United States Patent Office will be mailed by The Engineering and Mining Journal upon the receipt of 25 cents. British patents are supplied at 40 cents. In ordering specifications, correspondents are requested to give the number, name of inventor and date of issue.

COPPER

LEACHING—Obtaining Zinc and/or Copper from Complex Ores or the Like. John R. Williams, Henry W. Bradley and Benjamin Bradley, Sheffield, Eng. (U. S. No. 1,006,330; Oct. 17, 1911.)

ORE TREATMENT—Process of Recovering Copper from Its Ores. Henry K. Hess, Philadelphia, Penn., assignor to American Copper Extracting & Refining Co. (U. S. No. 1,014,061; Jan. 9, 1912.)

GOLD AND SILVER

CYANIDING — Decanting Apparatus. M. R. Lamb, Milwaukee, Wis., assignor to Allis-Chalmers Co. (U. S. No. 1,007,954; Nov. 7, 1911.)

DREDGING—Apparatus for Discharging Dredge-hoppers and the Like. Otto Frühling, Brunswick, Germany. (U. S. No. 1,012,196; Dec. 19, 1911.)

HYDRAULIC MINING—Rotatable Hydraulic Nozzle. Alexander McComble, Grass Valley, Calif. (U. S. No. 1,012,398; Dec. 19, 1911.)

REDUCTION OF SILVER ORES. Colin G. Fink, Schenectady, N. Y., assignor to General Electric Co. (U. S. No. 1,013,931; Jan. 9, 1912.)

STAMP-ACTUATING MEANS. Hans Charles Behr, Johannesburg, Transvaal. (U. S. No. 1,012,187; Dec. 19, 1911.)

STAMP MILLS — Improvements in Stamp Mills for Crushing Ore and the Like. N. Leslie, Blackhall, Scotland. (Brit. No. 19,721 of 1911.)

TUBE-MILL LINING—Improvements in the Lining of Tube Mills. J. S. Rigby and D. Birrell, Liverpool, Eng. (Brit. No. 7801 of 1911.)

IRON AND STEEL

BLAST FURNACE—Safety Device for Blast Furnaces. Samuel B. Shutts and William McHugh, Joliet, Ill. (U. S. No. 1,013,961; Jan. 9, 1912.)

COPPERIZING—Method of Copperizing Iron. William George Clark, Geelong, Victoria, Australia. (U. S. No. 1,014,454; Jan. 9, 1912.)

FURNACE-CHARGING APPARATUS. Carl E. Bedell, Warwood, W. Va., assignor of one-half to Wheeling Steel & Iron Co. (U. S. No. 1,012,235; Dec. 19, 1911.)

MANUFACTURE — Improvements in the Manufacture of Steel. T. D. Mackie, London, Eng., and G. F. Forwood, Surrey, Eng. (Brit. No. 22,569 of 1910.)

MANUFACTURE OF IRON AND STEEL. Frank A. Wilmot, Bridgeport, Conn. (U. S. No. 1,012,310; Dec. 19, 1911.)

REGENERATIVE FURNACE. Thomas S. Blair, Jr., Elmhurst, Ill., assignor to Blair Engineering Co., New York, N. Y. (U. S. No. 1,012,236; Dec. 19, 1911.)

REGENERATIVE FURNACES — Improvements in Regenerative Furnaces. F. Bernhardt, Königshütte, Upper Silesia, Germany. (Brit. No. 28,982 of 1910.)

LEAD, ZINC AND OTHER METALS

ALUMINUM—Process for Pickling Aluminum and Its Alloys Prior to Galvanizing or Coating the Same with Other Metals. Stephan Jahn, Charlottenburg, Germany, assignor to Aktiengesellschaft Mix & Genest, Telephon- und Telegraphen Werke, Berlin, Germany. (U. S. No. 1,011,203; Dec. 12, 1911.)

TIN—Method of Detinning. Heinrich Brandenburg, Kempen - on - the - Rhine, Germany. (U. S. No. 1,012,511; Dec. 19, 1911.)

ZINC—Machine for Cleaning Muffles of Zinc Furnaces. Otto Saeger, Breslau, Germany. (U. S. No. 1,014,333; Jan. 9, 1912.)

ZINC—Method of Producing Zinc Oxide. Harry H. Hughes, St. Louis, Mo. (U. S. No. 1,014,062; Jan. 9, 1912.)

ZINC—Treatment of Complex Ores. Edgar Arthur Ashcroft, Sogn, Norway. (U. S. No. 1,011,897; Dec. 19, 1911.)

ZINC-LEAD ORES—Treatment of Refractory Zinc-lead Ores. Percy C. C. Isherwood, Leytonstone, England. (U. S. No. 1,011,962; Dec. 19, 1911.)

ZINC-LEAD ORES—Metallurgy of Metal Sulphides. Edgar Arthur Ashcroft, Sogn, Norway. (U. S. No. 1,011,899; Dec. 19, 1911.)

ZINC-LEAD ORES — Metallurgy of Zinc-bearing Lead Sulphides With or Without Small Admixtures of Other Metals. Edgar Arthur Ashcroft, Sogn, Norway. (U. S. No. 1,011,898; Dec. 19, 1911.)

MINING—GENERAL

BELT CONVEYOR. Jere L. Wentz, Passaic, N. J., assignor to Robins Conveying Belt Co. (U. S. No. 1,014,106; Jan. 9, 1912.)

CHANNELING MACHINE. Henry H. Mercer, Claremont, N. H., assignor to Sullivan Machinery Co., Claremont, N. H. (U. S. No. 1,011,221; Dec. 12, 1911.)

CLUTCH MECHANISM FOR WINDING OR HAULING ENGINES. Hans Charles Behr, Johannesburg, Transvaal. (U. S. No. 1,012,188; Dec. 19, 1911.)

CONVEYER BELT. Walter W. Spadone, New York, N. Y., assignor to Gutta Percha & Rubber Manufacturing Co., New York, N. Y. (U. S. No. 1,009,264; Nov. 21, 1911.)

DRILL—Portable Electric Rock Drill. John Albert Pierson, Pigeon Cove, Mass. (U. S. No. 1,011,841; Dec. 12, 1911.)

DRILLS — Improvements in Rock Drills. N. Staub, Schiffweiler, Germany. (Brit. No. 11,782 of 1911.)

DRILLS — Improvements in Rock Drills. Pedro Campo, Santiago, Chile, and F. H. Rapley, London, Eng. (Brit. No. 9215 of 1911.)

EXCAVATORS—Tooth for Excavators or the Like. Michel J. Woznack, Seattle, Wash. (U. S. No. 1,011,547; Dec. 12, 1911.)

FLUME. George L. Hess, La Junta, Colo. (U. S. No. 1,008,466; Nov. 14, 1911.)

FLUME OR CULVERT. Arvid Reuterdahl, Boise, Idaho. (U. S. No. 1,010,074; Nov. 28, 1911.)

LAMP—Acetylene Lamp. Martin William Moore, Springfield, Ill., assignor of one-third to George Conlisk and one-third to Joseph Lopez, Springfield, Ill. (U. S. No. 1,008,923; Nov. 14, 1911.)

MINE JACK. Charles A. Miller, Connellsville, Penn., assignor of one-half to John J. Malloy, Connellsville, Penn. (U. S. No. 1,009,545; Nov. 21, 1911.)

MINER'S LAMP HOLDER. Walker S. Adams, Parkersburg, W. Va., assignor of one-half to Perry D. Dye, Parkersburg, W. Va. (U. S. No. 1,011,003; Dec. 5, 1911.)

MINERS' LAMPS—Clip for Miners' Lamps. Grant I. Rawson and Llewellyn B. Shultz, St. Louis, Mo., assignor to Pilley Packing & Flue Brush Manufacturing Co., St. Louis, Mo. (U. S. No. 1,014,025; Jan. 9, 1912.)

MINER'S PICK. Frank E. Derschmidt, Ankeny, Iowa. (U. S. No. 1,014,575; Jan. 9, 1912.)

SHAFT LINING — Lining Wall for Shafts. George W. Jackson, Chicago, Ill. (U. S. No. 1,009,312; Nov. 21, 1911.)

ORE DRESSING—GENERAL

CONCENTRATION — Improvements in or Relating to Method and Apparatus for Ore Concentration. E. H. Nutter and Minerals Separation, Ltd., London, Eng. (Brit. No. 23,949 of 1910.)

CONCENTRATOR. Benjamin Franklin Cobb, Denver, Colo. (U. S. No. 1,010,348; Nov. 28, 1911.)

CRUSHER—Rock and Ore Crusher. Howard Roy Stacks, Glenside, Penn., assignor of one-half to Richard O. Kohler, Catasauqua, Penn. (U. S. No. 1,014,532; Jan. 9, 1912.)

CRUSHING MACHINES — Improvements in Crushing Machines. E. B. Symons, Milwaukee, Wis. (Brit. No. 11,223 of 1911.)

CRUSHING ROLLS. Jeremiah S. Frazee, New York, N. Y. (U. S. No. 1,014,383; Jan. 9, 1912.)

PULVERIZER. Arthur F. Williams, St Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Co., St. Louis, Mo. (U. S. No. 1,014,191; Jan. 9, 1912.)

PULVERIZERS—Screen for Pulverizers. Edward H. Frickey, St. Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Co., St. Louis, Mo. (U. S. No. 1,014,384; Jan. 9, 1912.)

PULVERIZING — Dust Deflector for Pulverizer Machines. Milton F. Williams, St. Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Co., St. Louis, Mo. (U. S. No. 1,014,193; Jan. 9, 1912.)

QUARTZ MILL. Charles Wallace, Denver, Colo., assignor to Wallace-Owings Machinery & Supply Co. (U. S. No. 1,014,273; Jan. 9, 1912.)

SEPARATION—Hydraulic System of Ore Separation. William Polglase and Frank Bates, Great Falls, Mont. (U. S. No. 1,012,151; Dec. 19, 1911.)

SEPARATOR—Centrifugal Ore Separator. Philip F. Peck, Chicago, Ill. (U. S. No. 1,012,097; Dec. 19, 1911.)

METALLURGY—GENERAL

CRUCIBLE FURNACES — Improvements in or Relating to Crucible Furnaces. L. Rosseau, Argenteuil, France. (Brit. No. 4171 of 1911.)

CUPOLA FURNACES — Improvements in Cupola Furnaces. P. Anderson, Arvika, Sweden. (Brit. No. 18,414 of 1911.)

ELECTRIC FURNACE. William C. Arsem, Schenectady, N. Y., assignor to General Electric Co. (U. S. No. 1,009,625; Nov. 21, 1911.)

ELECTRIC FURNACES — Improvements in Electric Furnaces. J. E. Florence, New York, N. Y. (Brit. No. 8998 of 1911.)

EXTRACTION—Improvements in and Relating to the Extraction of Metals from Ores. B. Bradley, Manchester, Eng. (Brit. No. 28,274 of 1910.)

FURNACE GASES—Apparatus for Purifying Furnace Gases. Utley Wedge, Ardmore, Penn. (U. S. No. 1,012,488; Dec. 19, 1911.)

LIME BURNING—Process of Burning Lime. John G. Jones, Carthage, N. Y. (U. S. No. 1,011,804; Dec. 12, 1911.)

OIL-BURNING PLANTS—System of Regulation for Oil-Burning Plants. Jas. R. Atchison, San Francisco, and Clarence R. Weymouth, Berkeley, Calif., assignors to Chas. C. Moore & Co., Engineers, Inc. (U. S. No. 13,337; Dec. 12, 1911.)

REDUCTION—Improved Process for the Reduction of Metals from Their Ores. A. Berglof, Chicago, Ill. (Brit. No. 20,115 of 1910.)

REFRACTORY BODY and Process of Making the Same. Edward Goodrich Acheson, Stamford Township, Welland County, Ontario. (U. S. No. 1,014,199; Jan. 9, 1912.)

ROASTING — Improved Process and Apparatus for Roasting Fine Ores. W. Buddeus, Wiesbaden, Germany. (Brit. No. 1131 of 1911.)

SMELTING FURNACE with Electric Refining Hearths Connected Thereto. A. Helfenstein, Vienna, Austria. (Brit. No. 5140 of 1911.)

PERSONAL

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

H. H. Knox is examining mines in Bulgaria.

W. Rowland Cox, of New York, has opened an office at Los Angeles.

W. J. Elmendorf, of Spokane, Wash., general manager of the Portland Canal Mining Co., is in Toronto, Ont.

T. N. McCauley, general manager of the Mascot Copper Mining Co., Bisbee, Ariz., has been in San Francisco.

John Kiddie has been given charge of the Arizona Copper Co.,'s engineering department, at Morenci, Arizona.

Ernest Levy, manager of the Le Roi No. 2, Ltd., at Rossland, and the Van-Roi Mining Co., Slocan Lake, has gone to London.

Ernest Williams, who has been in charge of operations at the Bewick-Moreing properties in Porcupine, Ont., will return to England soon.

J. M. Ruffner, manager of the North Columbia Gold Mining Co., operating hydraulic mines in Atlin, B. C., has gone to Cincinnati for the winter.

George H. Garrey, who recently accepted the position of mining geologist for the American Smelting & Refining Co., and allied Guggenheim companies, is in New York.

Herman L. Schneider, for over six years with the Rio Tinto Copper Co., at Terrazas, Mexico, has resigned his position as manager and will be for the present at El Paso, Texas.

George M. Richards, of New York, has gone to London on professional business, and expects to remain there several months. His address will be in care of the Union of London & Smith's Bank, London, England.

Henry Hanson, who is superintending the construction of the mill for the Merrill Metallurgical Co., of San Francisco, at Porcupine, Ont., will join the staff of the Dome mine as mill superintendent when construction is completed.

W. H. Yeandle has been transferred from the position of assistant general superintendent of the mining department of the Cia. Real del Monte y Pachuca and is now connected with the Exploration Department of the United States Smelting, Refining & Mining Co., Mutual Life Building, Mexico City.

H. A. Barren has been appointed general superintendent of the blast furnaces and steel works of the American Steel & Wire Co. in the Cleveland and Pittsburg districts, succeeding J. W. Carpenter, resigned. B. D. Quarrie has been appointed general superintendent of the Newburg steel works and blast furnaces of this company at Newburg, Ohio, succeeding H. A. Barren, promoted.

OBITUARY

Clark T. Shaw died at Manhattan, Nev., Jan. 12, aged 54 years. His death was due to poisoning by cyanide of potassium. He was from Massachusetts and had been in Nevada for some time, and was known as a competent mill manager. He has been in charge of the War Eagle mill, at Manhattan, and was about to take charge of the Lemon mill.

Thomas H. Rooney died at San Francisco, Jan. 9, aged 66 years. Mr. Rooney was born in New York City and went across the plains to California in 1850 with his mother, the father having gone the previous year around the Horn. He was a brother-in-law of James Fair, and uncle of Mrs. William K. Vanderbilt and Mrs. Herman Oelrichs. He had charge of the sinking of the Union shaft on the Comstock in the '60s; was afterward superintendent of the Sierra Nevada, and was for a long time associated with Fair, Mackay and Flood in their Virginia City operations.

Thomas S. Kilgallan died at Wallace, Idaho, Jan. 14, aged 59 years. He was born in New York, and at an early age began work in the anthracite mines of Pennsylvania. In 1879 he went to Butte and was a resident of the city up to the time of his death. He was employed at a number of mines and worked his way up to be superintendent of the Colusa-Parrot and later of the Stewart and the Original. He retired about 10 years ago, but was interested in mines in Montana and Idaho. Mr. Killgallan was active in politics and served several terms in the Montana legislature. He leaves a widow, one son and five daughters.

Archibald G. Brownlee died at the Stanley mine, near Idaho Springs, Colo., Jan. 16, aged 55 years. He was born at Ottawa, Canada, and came to this country when a boy. He served several years in the U. S. Army and was for some time Indian agent in North Dakota. About 1890 he became engaged in mining in British Columbia and then in Alaska. He went to Colorado about 1901, and was concerned with several mines. Among them are the Japan-Flora group, near Telluride, and the Stanley mines in Clear Creek County, both of which he developed to a great extent. He was the principal organizer of the Western Metals Co., which built a mill at the East Griffith mine, in the Georgetown district. He was a member of the Colorado Scientific Society.

John W. Young died, Jan. 14, at his home at Evanston, Ill., aged 58 years. He was born in Brooklyn, N. Y., and took a degree as mining engineer at Columbia in 1879. He at once began active life in his profession. He later became a dealer in mining machinery and went to Chicago as the representative of a New York firm. In 1890 he was made vice-president of the Fraser & Chalmers Co., which office he held until 1898, when he became European representative of the Allis-Chalmers Co. In 1907, on the organization of the Chalmers-Williams Co., Mr. Young was made vice-president and a director of the company. Mr. Young was a member of the Chicago Club, the American Institute of Mining Engineers, Montana Society of Engineers, the Engineers' Club of New York, the Midwood Club of Brooklyn, and the Alta Club of Salt Lake City. He leaves a widow and a son.

John B. Hobson died at Victoria, B. C., Jan. 10, aged 67 years. He was born in Ireland and came to this country with his father when a child, settling in California in 1849. He had some preliminary training as an engineer in San Francisco, and after working as a contractor for a time, he became interested in hydraulic mining in Placer County. From 1871 to 1891 he was in charge of several mines at Iowa Hill, which included some of the largest operations of that kind in the state. Together with the late Jacob H. Neff he was instrumental in organizing the State Miners' Association, and in its interest went to Washington with the late Judge Niles Searls and former congressman J. K. Luttrell to secure legislation to rehabilitate hydraulic mining. The result of these efforts was the so called Caminetti bill, which now regulates that industry in this state. From 1889 to 1890, Hobson was an assistant to State Mineralogist William Irelan, Jr. In 1892 he went to British Columbia, where he opened up the Cariboo and Horsefly hydraulic mines in the Cariboo district for Sir William Van Horn and other large owners of the Canadian Pacific railway. When a few years later these properties were taken over by the Guggenheims, Hobson remained as their manager. Recently he engaged in the work of developing hydraulic mines of his own in that territory. He was for the past 20 years a prominent figure in British Columbia mining. In California he is remembered as the associate of Jacob H. Neff and the Colemans in bringing hydraulic mining to its greatest prosperity.

Societies and Technical Schools

Northwest Mining Convention—The Mining Men's Club, of Spokane, is actively engaged in preparations for the proposed convention, at Spokane, Wash., Feb. 15-17. Invitations have been sent to the mining men of the Northwest, including Alberta and British Columbia. Among the subjects proposed for discussion are mining laws; water-power development and metallurgical economies; prospecting and mine promotion; mine development and management; and safeguards of mining investment.

Editorial Correspondence

From our Representatives at Important Mining Centers

San Francisco

Jan. 16—It is claimed by a special agent of the State Conservation Commission, acting also for the board of control under the law regulating appropriation of water, that 95% of the water-power locations in California are made not in good faith but for speculation purposes; that valuable water-power sites are being held by a man and a wheelbarrow, by the building of cabins and blazing of trails and by making surveys. The plan of the speculator, according to the special agent, is to stay on the ground until it is ascertained whether or nor any large company or interest is likely to purchase the right. If this is the condition the board of control must have been more mindful of the application fee of $10 than of the character of the applicant and the purpose of the appropriation. The law, approved Apr. 8, 1911, plainly provides that "the applicant shall set forth the nature and amount of the proposed use, the head and amount of the water to be utilized, the uses to which the water and electricity, or electrical or other power are to be applied, the location, character, estimated capacity, and estimated cost of the works," and other like provisions that a mere speculator would find difficulty in complying with if the board of control enforces them.

The law further provides that actual construction work shall begin within six months from approval of the application, and that the board of control has six months for consideration and rejection of the application. The facts that the applicant is not required to do anything in the first six months, and that the board of control may within that period reject his application, make it wholly unnecessary for the applicant to even buy a wheelbarrow; if at the end of the six months there is no better evidence of good faith than the class of labor referred to it would be the duty of the board of control to put the speculator off the ground and revoke his license for failure to comply with the requirement respecting the commencement of actual construction. The law is simple, plain and sufficient, and six months is a liberal allowance for a *bona fide* applicant to begin work. If the condition reported by the special agent is the result of careless conduct of the board of control, as appears to be the case, the remedy should be provided by the board without recourse to the courts. It would be manifestly unfair to the *bona fide* applicant for the use of water to develop electricity or electrical or other power, to compel him to pay the speculator a bonus for a pretended water right to which he is not legally entitled, or to take the matter into the courts. If the law is not sufficient protection against irresponsible locators, it can be repealed.

Denver

Jan. 18—The below-zero weather at Cripple Creek and the fact that one of the large mines which discharged into Wilsac Creek, had temporarily ceased pumping, shortened the water supply so that the mill of Strattons' Independence was compelled for a few days to close down, but warm weather and the resumption of pumping operations have ended the water famine and the mill is running again as usual.

The El Paso, which is one of the representative and successful mines of Cripple Creek, now has about $120,000 cash in the treasury and 133,333 shares of the Cripple Creek Drainage Co., which the mining company subscribed for at $1 per share. This company has a clean and efficient management under Allan Burris, its president. He worked for wages in the mine for years, under former superintendents, knows every foot of the property and is the only president of any mine in Cripple Creek who spends most of his time underground.

Driving tunnels to develop at depth veins which in early days produced largely from the surface and since were abandoned for various reasons, is now the order of the day in nearly all Colorado mining districts and in the Georgetown district they are particularly active. On Saxon Mountain the Culley tunnel, now in 910 ft., is to be driven some distance further to the intersection of several known veins, chief of which is the Anamora, credited with a former production of $500,000. The tunnel of the Golden Glory Mining Co., now in 800 ft., will be driven steadily through the year to the intersection of several veins. This enterprise is financed by cattlemen of Fort Worth, Texas. The Eureka adit on Griffith Mountain is to be driven steadily ahead for a similar purpose and a contract to drive the Prudential tunnel, now in 900 ft., has been awarded to R. A. Patterson, the object being to cut the Magenta vein which is 75 ft. wide on the surface with good indications.

The production of San Juan County was slightly less in 1911 than during the preceding year, this being due chiefly to the traffic blockades, caused by floods in the Animas River and tributary streams. This blockade lasted from Oct. 4 to Dec. 10. Since the opening of their lines the railroads have enjoyed splendid business and much accumulated ore and concentrates are being moved. The outlook for the coming season in this county is cheerful. The year will probably be marked by greatly increased activity in the South Mineral Creek area and on the Eastern or Gold range, where is the Buffalo Boy mine, which created some excitement by reason of rich ore finds.

Butte

Jan. 17—B. B. Thayer, president of the Anaconda Copper Mining Co., is in Butte making his semiannual inspection of the companys' properties. Mr. Thayer is well pleased with the prosperous condition of the camp and with the appearance of the mines, which he believes to be in better condition and in a more advanced stage of development than ever before. By reason of the cheap electric power which can be furnished in large quantities to the mines of Butte, and, in fact, all over the state, from the immense hydro-electric power plants at Great Falls and along the Missouri River, he believes that mining will in the future be conducted on a much cheaper basis than formerly, and that copper in particular will be mined at a considerably lower cost after the hoists of the Anaconda company are all operated by compressed air generated by electricity, and ore-hauling in the principal mines is done with electric motors in place of horses.

In the country adjacent to Maiden, in Fergus County, considerable capital has been interested in the last year and a number of properties are being developed. Extensive work has been done at the Cumberland mine, several bodies of gold ore having been opened preparatory to mining operations. Several other properties which have been developed in a small way, are now being financed, and it is expected that cyanide plants and concentrators will be built at a number of them soon, for the treatment of the lower-grade ores. Fergus County has become famous for its sapphires, some of the finest ones in the world having been found there; the sapphire mines in the Yogo district were operated during 1911 successfully, and some new territory was explored. The London &

American Sapphire Co., which has developed a number of producing mines, owns the majority of the producing properties in that district.

Salt Lake City

Jan. 18—The Utah Apex Mining Co., at Bingham, is adding to its output and increasing earnings. During November, receipts from ore shipments amounted to $38,306, while other receipts brought $1470. The operating expenses were $21,184, including construction and equipment charges, amounting to 43c. per ton of ore mined. This left a net profit for the month of $18,592. Aside from the new equipment and construction, on a mining-cost basis the profits amounted to $20,577. There was shipped 1765 tons, net weight, of first-class ore, and 4524 tons of ore were sent through the mill, making a total of 6289 tons mined. The concentrates produced amounted to 1991 tons.

Good progress is being made by the International Smelting & Refining Co. in the erection of the lead smeltery at Tooele. Material used in construction has been arriving promptly. The flues, bag-house and stack are finished, and the ore bins are nearly completed. The blast-furnace building has been erected, and the foundations for the sintering plant completed. It is expected that the lead plant will be put in commission by Feb. 15, when the two furnaces of 250 tons capacity each will be blown in. The plant should be in full blast by Mar. 1. The supply of lead ores is coming chiefly from the Cœur d'Alene, Idaho, and from Park City and Tintic. Ore is also being received from Lemhi County, Idaho, and more is expected from that region. Some lead ore is also being received from Montana. The iron ore for fluxing will come from Pioche under a contract with the Prince mine for 200 tons per day. Shipments of tailings from the old pan-amalgamation mills at Bullionville owned by the Prince, are now being received, and shipments of iron-manganese fluxing ores, carrying some silver and lead, will be started from the Prince mine proper when the new 8-mile railroad spur has been built from Pioche to the mine. Surveys for this spur are being made, and grading and construction will be started soon. In addition to the iron-manganese fluxing ores the Prince mine will also ship a higher-grade silver-lead ore. The three reverberatory furnaces are smelting copper ores and are treating about 600 tons per day.

The following is an estimate of the production of Utah smelting plants during 1911: Gold, 240,039 oz. @ $20.67 per oz., $4,961,606; silver, 12,573,931 oz. @ 53.27c. per oz., $6,698,233; lead, 117,593,855 lb. @ 4.42c. per lb., $5,197,648; copper, 131,782,916 lb. @ 12.27c. per lb., $16,169,764; zinc, 10,541,198 lb. @ $5.71 per 100 lb., $601,902; $33,629,153, total value.

Negaunee, Mich.

Jan. 19—In accordance with the policy adopted nine years ago, the United States Steel Corporation has again offered employees an opportunity to invest a part of their earnings in the company's stock under favorable conditions. The subscription price for the preferred stock that the company is to issue at this time is $116, and $65 is to be the price for the common stock. Under the plan adopted by the corporation when the first stock was issued to employees, those earning $1100 or less per year may not subscribe for more than one share of the preferred stock, while those receiving between $2000 and $3000 annually may subscribe for as many as 15 shares. Of the common stock, employees earning under $500 per year are limited to one share, with a maximum of 25 shares for the highest-salaried employees or officials. Payment of the subscriptions is to be made in monthly installments, to be deducted from salaries or wages. There is a number of the Corporation's employees in the iron-ore mines holding stock, some of them having bought when the offer was first made.

Deadwood

Jan. 19—A good January thaw has set in, and work is progressing much more smoothly at the mines in this district. The Wasp No. 2 found it necessary to suspend operations, as the deep snow and cold weather interfered with operations. Construction work at several properties, which was seriously hampered, has been resumed. At Galena the Black Hills smeltery is rapidly nearing completion, and a continuation of the pleasant weather should see it finished on contract time, Feb. 1. Owing to a combination of deep snow and a landslide, which took out a section of the track, the spur to the Victoria mill, in Spearfish Cañon, will not be in shape for the delivery of coal when work is resumed at an early date, and for that reason no attempt will be made to operate the air compressor, and mining will be done by hand methods. The large amount of snow which has fallen assures a good supply of water for mining purposes during the coming summer, and operations will be stimulated.

Wallace, Ida.

Jan. 17—The snowslides of the last few days which were common in the outlying cañons proved disastrous in several places and caused a total of five deaths. Two men were killed on Big Creek, two at Sunset and one at Mace. In many other places the slides carried away cabins and other property which happened to be in their paths. A slide occurred at Mace over the same path taken by the disastrous slide of February, 1910, when a dozen persons were killed. This one, however, moved slowly and started lower down the mountain.

Porcupine

Jan. 18—The closing down of the Foley-O'Brian mine probably marks the end of what once was one of the best known and best thought of Porcupine properties. The stock of this company has shown an almost continuous decline since it was first issued. Various theories are put forward as the reason for the shutdown, but underground development has been disappointing, and it is probable that this is the cause.

For some time past, those interested in mining in northern Ontario, have been endeavoring to have several changes effected in the Mining Act, and announcements of some of these were made a few days ago. Permits for prospecting in the Forest Reserve can now be obtained in the local recording office, instead of having to send to Toronto, as was formerly the case. Reductions have also been made in the fees for transferring interests in a mining claim. The Department also has under consideration the withdrawal of the townships of Ogden and Deloro, from the Forest Reserve, but this is a matter that will require special legislation. It is believed that these changes mark the commencement of a general reduction in all fees to the Recording Office.

Mexico

Jan. 15—In a recent interview with the *Mining Gazette*, at Houghton, Mich., U. S. A., Julio Madero, brother of President Madero, made some interesting statements. Regarding foreign investments in the Republic, he said: "American capital in Mexico is in a better position than ever. The government will offer every inducement and guaranty to foreign capital as we need it to develop the country."

Concerning the political situation he said: "The situation in Mexico is not nearly so complicated nor so serious as some of the press reports have seemed to indicate. Normal conditions, toward which the country made rapid strides after the revolution, have not been affected by the unsuccessful attempts to consolidate the several local disturbances into a revolution. My brother has been in office less than two months; at the end of three you will see the country completely pacified and started upon a new period of prosperity and development.

"If you Americans will only look back to your reconstruction days, and then consider how much more complete is the overturning of the local governments in Mexico, you will cease to wonder at the existence of petty disturbances now in Mexico. But the army, including all the men who fought perfunctorily to sustain President Diaz, are loyal to the present government and will sustain it to the end."

The Mining News

The Current History of Mining

Alaska

The following gold shipments were received at the U. S. assay office in Seattle, during 1911: Circle, $38,083; Cook Inlet, $139,388; Copper River, $216,477; Eagle, $49,979; Iditarod, $1,116,016; Koyukuk, $135,852; Nome, $1,862,317; southeastern Alaska, $169,497; Tanana, $1,089,368; total, $4,816,981.

Jesson Brothers will work their property, at the head of Chatham Creek, in the spring. A tunnel is now in 150 ft., and this will be extended.

Carlisle Fraction—This property has been leased by A. Littlewood, Fairbanks, who will develop it as soon as the weather permits.

Arizona

Gila County

Southwestern Miami—Hole No. 2 is 330 ft. deep and is being continued. At the annual meeting of stockholders to be held in Globe on Feb. 12, it is proposed to increase the capitalization from 50,000 shares to 100,000 shares, $5 par value.

Old Dominion—The preliminary work in the concreting of the Kingdon shaft to 1000 ft. depth has begun, under the direction of Contractor Paul Michaelson and C. H. Weideman, construction engineer.

Arizona Commercial—Charles S. Smith, president of the company, is visiting the mines and states that work will not be begun by the new company until the bonds of the old company have been foreclosed and the new company takes possession of the property, which will probably be some time in June or July. It is proposed to confine the work to the old Copper Hill shaft, near the United Globe ground, and to make some arrangement with the Superior & Boston whereby the latter company will develop the ground tributary to the Eureka shaft.

Magma—James Neary, superintendent of this copper mine, at Superior, 30 miles west of Globe, was in Globe recently and purchased three teams from the Superior & Globe mining company to be used in hauling ore from the mine to Florence, whence it is shipped by rail to the El Paso smeltery. Mr. Neary states that 300 ft. of drifting have been done on the eighth level, opening a vein of copper ore 15 ft. wide in places, the shipments averaging 26% copper. The ore on this level consists mostly of the rich sulphides, bornite and covellite. About 60 men are employed and 150 tons per month are being shipped. The mine was formerly known as the Silver Queen and is now owned by the Gunn-Thompson Company.

Miami—It is proposed to resume churn drilling soon, but this work has not yet been started as reported in some Eastern papers. The ground to be drilled lies a few hundred feet northeast of the present developed orebody and the surface indications are believed to be favorable to the existence of another body of ore.

Live Oak—Three drifts have been started from the station on the 800-ft. level in No. 2 shaft and all are breasted in ore. Drifts and raises are being driven in ore at the east end of the orebody on the fourth level.

Inspiration—The temporary warehouse is finished. Underground work has not yet been resumed and construction of the dam across Pinal Creek is progressing satisfactorily. About 120 men are employed. The telephone line from the dam site to the mine is nearly completed. The Arizona Eastern R.R. Co. has instituted condemnation procedings in the district court to obtain a right-of-way for the extension of its line from the present terminus at Miami to the portal of the main tunnel of the mine, a distance of less than one mile. It appears that J. P. Morgan & Co. is the dominant banking interest in the underwriting of the stock and bond issues of the Consolidated company.

Duquesne—Ore is being hauled from this group, 15 miles west of Globe, and loaded on the car at Miami, preparatory to shipping to the smeltery at El Paso. The ore is reported to run well in gold, silver and lead.

Santa Cruz County

Arizona-Pittsburgh—Work has been resumed on this copper mine, under the charge of Frank Siebold.

Black Hill—J. F. Orosco, owner of this group, has made a good strike of shipping copper ore. The ore is wide and contains both copper and silver.

Glove—Sheehy Brothers are getting out a new shipment of five or six cars of carbonate ore. They have about decided to sink a deep shaft and will be in the market for machinery.

Marsteller—This group of claims, near Nogales, has been bonded to Col. O. P. Posey, who is doing work on them. The vein is from 18 to 25 ft. wide and shows high-grade gold ore on the surface.

California

Amador County

Kennedy—The board of directors and Superintendent Smith were reëlected at the annual meeting held at San Francisco in December.

South Amador Mining Co.—This company is reported to have made a payment under contract of purchase of the group of properties composed of Amador Queen No. 2, Schoolhouse, Aetna and the McKay ranch. The properties are held by C. D. Porter under bond from W. J. McGee, of San Francisco. An electric hoist has been installed on the Queen. J. McCorsley is manager.

Penn Mining Co.—Representatives of the boards of supervisors of Amador, Calaveras and San Joaquin Counties visited the copper mine and smeltery at Campo Seco, Jan. 4, to investigate the conditions that have caused complaints by the farmers regarding the smoke fumes. The company has made efforts to neutralize the smoke and has agreed to try further to satisfy the farmers.

Butte County

Drobnier Dredging Co.—This company has been incorporated with head office at Chico, to operate on lands south of Oroville. The directors are D. Breslauer, E. F. Coutolenc, O. A. Shaw, C. C. Jends, B. F. Hudspeth and H. H. Shaw, of Chico, and L. F. Riley, of Oroville. Capital stock is $250,000.

Calaveras County

Lightner—This property at Angels has been purchased at sheriff's sale by W. J. McGee, of San Francisco. The price paid was $85,000 in satisfaction of judgment held by James V. Coleman, owner of the Angels mine, adjoining.

Fresno County

Recent development of mining claims in the vicinity of Dunlap has induced the establishment of a post office. The camp is situated about 40 miles east of Fresno and is reached by stage 28 miles northeast from Sanger. It has attracted a good deal of attention during the last year.

Humboldt County

California Mining & Dredging Co.—This syndicate has made an agreement of sale of its properties to Wilson Foster, at a price said to be more than $300,000. Other properties in the vicinity of Orleans will be included in future negotiations.

INYO COUNTY

Woodin-Grant—Ore from these claims at the summit of the White Mountains is being milled at the Bradford mill near Aberdeen station. I. J. Woodin and W. T. Grant are the owners.

KERN COUNTY

Santa Ana—Fifteen tons of ore averaging $20 per ton are reported as the daily output. The Four Ace Mining Co. is the owner.

Grand Tank—William Bouchard has sold this group of claims to T. B. Peterson and A. F. Dejdrick. The purchasers are owners of the Brymer group, from which they extracted 10 tons in December, which were treated at the Red Dog mill, returning $160 per ton.

MARIPOSA COUNTY

Crown Lead—The 20-stamp mill is running one shift and a large amount of development is being done. Thirty men are employed. G. S. Ireland, Coulterville, is superintendent.

Oro Rico—The 20-stamp mill is reported to be running on good ore. Thomas Mutton, Coulterville, is superintendent.

Bondurant—This property is still inactive owing to the failure of adjustment of the bond, though it is reported that there is prospect that matters will be settled and operations resumed soon.

MONTEREY COUNTY

Buclimo—Active preparations are in progress for driving a new tunnel and the installation of assay and cyanide plants. James White, Watsonville, is superintendent.

NEVADA COUNTY

The flumes along the San Juan ridge and at Graniteville, that were destroyed by the heavy snows of last winter, have been repaired and the prospects are good for a better season of mining this year than last. The snow of the present winter fell on dry ground and the freeze that followed was discouraging, but the recent moisture in the precipitation should insure abundant water.

Prudential—There is prospect that this mine will resume operation. George A. Aldrich still holds the bond, but has done no active work for several weeks. W. R. Burch, and others of San Francisco, are said to be interested in the property.

Le Duc Gold Mining Co.—The following officers have been elected: John P. Jones, president; B. A. Penhall, vice-president and general manager; Dr. W. G. Thomas, secretary; Frederick Allen and James Sampson, directors.

Murchie—The property of the Murchie Gold Mines Consolidated and the Murchie Extension has been sold to the Pacific Gas & Electric Co., to satisfy judgments awarded the South Yuba Water Co., amounting to $9800. The Murchie companies have one year in which to redeem. The mine is considered a good one, but has been tied up financially and has not produced for several years.

Colorado

CLEAR CREEK AND GILPIN COUNTIES

Smuggler—Franchini & Co., lessees in this mine, on Brown Mountain, have opened gray copper ore on the fourth level, the shoot being 100 ft. long.

Chicago Mountain M. & T. Co.— The six mining claims owned by this company, on Chicago Creek, near Idaho Springs, have been taken over by R. R. Graham and H. B. Baker on a 5-year lease and bond, and will be developed as rapidly as possible.

Wyoming Mining & Tunnel Co.—A syndicate of Pennsylvania men is said to be backing this company, which has commenced driving the tunnel to cut the Silver Age, French Flag and other veins on its course.

CRIPPLE CREEK DISTRICT

Isabella—Davis & Hughes, lessees in Emma No. 1 shaft, have reported a discovery of 5 ft. of ore, 50 ft. long and assaying $60 per ton. The values are in sylvanite and free gold.

Strattons' Estate—J. B. Polly and F. S. Chilson report that under their lease on the Six Points, on Bull Hill, they have opened an oreshoot of extraordinary richness, and that they have opened it at a greater depth by a crosscut from the Los Angeles mine, on which they obtained a lease for that purpose. The sampler controls show that the ore in carload lots yielded 6 to 8 oz. in gold per ton. Five cars have already been sent out.

American Eagles—At this mine of the Strattons' Estate, leased by the Colorado Mines Investment Co., of Denver, rich ore has recently been opened at the 1100 level. Three carloads of 2-oz. gold ore per week are being shipped. The width of the orebody is about three feet.

LAKE COUNTY—LEADVILLE

Helena—Twenty-four men are now employed at this Iowa Gulch mine, and the vein is getting wider with an increased grade of ore.

Sugar Loaf Consolidated—This mining and tunnel company is shipping a good grade of ore regularly from the old Sherrill workings and the main tunnel is being driven ahead.

Chip—In a drift from the bottom of the shaft, a vein of high-grade silver-copper ore 1 ft. wide has been opened. It is supposed to be an extension of the vein that was found in the Elk shaft at the head of East 5th St., 25 years ago.

Dome—Sixty tons per week of carbonate-of-zinc ore are being shipped by the lessees.

King Solomon—This company, operating at Frisco, Kokomo and Alice, is stated to have had a successful year at the King Solomon tunnel, Frisco, on No. 11 vein; a block of lead-silver-gold ore has been developed for stoping, 100 ft. long, 100 ft. in depth and 3 ft. wide. Late last autumn the company unwatered the Wilson mine at Kokomo and is now shipping ore to the mill regularly.

OURAY COUNTY

Revenue—The important announcement is made that A. E. Reynolds has retired from the management of this company, his entire holdings going into the hands of a Kansas City corporation, with Edwin H. Platt as manager at the mine. The Revenue mill is to be reconstructed and extensive development done on the Cumberland vein.

Bard Creek Co.—This company has done nearly 2000 ft. of work on its Lincoln Mountain group, and has opened some gold and silver ore for 80 feet.

National—A strike of high-grade galena is reported in this mine, in the West Argentine district.

SAN JUAN DISTRICT

Gold King—This mine, opened in a judicious manner by Mears & Slattery, is assuming proportions of a larger mine, and is being credited with the production of much rich ore. It is being operated partly under a subleasing system. The mine is under the personal supervision of J. H. Slattery.

Silver Ledge—W. Z. Kinney has resigned the management of this mine, Leo F. Arnold succeeding. Jig practice has been temporarily suspended in the mill, which continues to produce zinc and lead concentrates. It is reported that another shoot of ore was recently encountered on three levels, while excavating wall rock for waste.

Sunnyside—The mine continues steady production. By taking over the property of the Quartz Mining & Milling Co., which included the Washington, Oregon, Mother Goose and Grand View mines, well known properties worked in the early days, it has materially increased its holdings. With the Terry tunnel, driven under the management of J. T. Terry, one of the present owners, the property is in an improved condition. At the mill, the American Zinc Ore Separating Co. is installing its initial Colorado plant, using the Huff electrostatic machines for the treatment of zinc ores. The buildings, foundations, etc., constructed under the direction of William T. Terry, metallurgist for the property and a coöwner, are completed and the machinery is on the ground ready for installation. The outcome of these operations is being earnestly watched, as its success may mean a larger production of zinc-bearing ore in this section.

Idaho

Coeur d'Alene District

Stewart—The new tunnel at the mine struck an unexpected orebody recently. The discovery was made just after the tunnel passed the Osburn fault and is nearly 2000 ft. from where the main orebody should be encountered. The extent of this apparently new vein is not yet known. The tunnel has been constructed with record-breaking rapidity. Little trouble has been encountered in passing through the fault zone, practically no water coming from there. It is now thought that the large volume of water which had to be contended with in the Calodonia tunnel in cutting the fault, has practically drained it above that level. Preparations are being made to construct the portal buildings so that they will be ready for use should the orebody encountered prove to be the main one.

Black Horse—This company has just completed the installation of a 10-drill Ingersoll-Rand compressor. The company now has a 100-hp. gasoline engine in working condition and will start the compressor soon. The use of machine drills will greatly aid in development. The property is situated in the Murray district.

Michigan

Copper

New Baltic—Development work has reached the west vein of the lode at the 500-ft. level, showing an encouraging amount of copper. Some drifting has been done on the main lode at this level, which was encountered about a month ago, and the showing is an improvement on the character of the ground exposed at the 360-ft. level.

Franklin—The new hoisting engine at No. 1 Pewabic shaft is being tested out and after necessary adjustments will go into commission. Everything is in readiness at the mine and mill to begin production on an increased scale.

Mayflower—Owing to the extremely severe weather that has prevailed throughout the district for the last three weeks, progress on No. 17 drill hole has been necessarily slow. This hole is going down to secure additional data on the formation that revealed such a rich core in No. 16 hole.

Hancock—No. 2 shaft has penetrated the lode, designated as No. 6, for a distance of about 20 ft., and has not as yet reached the foot wall; the lode is well mineralized in shot and fine copper. Shaft-sinking is going forward with all possible speed and it is estimated that another lode or branch of the Pewabic main lode will be reached a short distance below the present one, and that the Pewabic lode, the objective point, will be reached about Mar. 1. The disclosure of copper in such quantities in the various lodes affiliated with the Pewabic is most gratifying and strengthens the belief that the main lode when encountered will be heavily mineralized.

Centennial—The north drift from the 27th level has been connected through with the No. 1 shaft of the South Kearsarge, affording better ventilating facilities for both shafts. The extension of lateral openings north from No. 2 shaft is approaching the mineralized zone of the Kearsarge and Wolverine properties, and it is stated that an improvement is being noted in the quality of the rock in some portions of the openings.

Wolverine—The company has extended the exploratory crosscut from the 28th level drift, eastward about 1400 ft., and there is about 1200 ft. more to go before reaching the boundary. Results will be watched with interest, as this section is attracting a good deal of attention.

Mohawk—No. 6 shaft has reached the lode at the ninth level. Drifts north and south from the levels above are opening ground that is much improved over that of the northern workings. The remaining five shafts are all sinking, and the rock going to the mill from the various openings is about the average grade.

Iron

Lake Superior Iron & Chemical Co.—At a recent meeting of directors in New York, Frank W. Hutchins, of Detroit, was elected treasurer, to fill the vacancy caused by the resignation of A. Van Oss. The company owns and operates six charcoal pig-iron furnaces, with charcoal and chemical plants at Ashland, Wis., and Manistique, Newberry, Boyne City, Elk Rapids and Chocolay, Mich. It also leases and operates the Yale iron mine, at Bessemer, Mich., and owns over 100,000 acres of hardwood timber land and 47 miles of railroad. The general offices are in the Penobscot Building, Detroit, Michigan.

American Mine—This hard-ore mine of the M. A. Hanna interests, situated 10 miles west of Ishpeming, has a contract to ship 60,000 tons of ore to the Algoma steel mills at the Canadian Soo and about 500 tons per day are being forwarded.

Winton-Vermillion Iron Co.—This company's lands, two miles east of Negaunee and near Eagle Mills, are being drilled by W. T. McCarthy, diamond-drill contractor of Negaunee. The company has 680 acres in Sec. 34—T. 48 N.—R. 26 W. It seems rather too far to the east to expect iron ore, as the formation in the vicinity is generally believed to be Siamo slate. The same interests control the Flynn property in Minnesota and are also opening a shaft near the Canadian Soo. Albert Salzer, of Minneapolis, is president of the company and George I. Gorham is secretary and treasurer.

Oliver Iron Mining Co.—The two diamond drills recently operated in the Cyr swamp, south of Little Lake in the Gwinn district, for which the Duluth Diamond Drill Co. had the contract, were called in several weeks ago by the Oliver company.

Minnesota

Mesabi Range

It is reported that the contract for the work of changing the course of the Embarrass River will be let before the season opens, with the idea that the work, which is a large undertaking, will be finished before the end of 1914, or the expiration of the Oliver Iron Mining Co.'s Hill lease.

Buffalo-Susquehanna—The Winston-Dear Co. has closed down operations at this property at Hibbing for the season. This is the last of the contracting companies to suspend stripping operations on the Mesabi Range.

Grace—This mine, which was recently acquired by the Inland Steel Co., will be one of the producers in the season of 1912. Much of the surface work, which has been done under contract, has been completed. William Wearne, general superintendent for the company on the Cuyuna and Mesabi Ranges, is in charge.

Kellogg—This mine, operated by the New York State Steel Co., at Biwabik, will commence mining operations on Feb. 1. It is one of the large underground properties in the district, and will employ a force of about 300 men when working up to capacity. H. F. Kendall, general superintendent for the company, is in direct charge of operations.

Montana

Butte District

Anaconda—In the suit instituted against the Anaconda company, by Gus J. Kohl, the latter claims that he located the claim in 1890, and that he disposed of a two-thirds interest in it to the men from whom the Anaconda company purchased the property. He asks for an accounting of the ore extracted since then, alleged to be worth $3,000,000, and for one-third of the profits.

Tuolumne—Steam was turned into the new plant, Jan. 15, and it is expected that it will be placed in final commission before Feb. 1. The crosscut on the 1800-ft. level recently cut the north vein, and drifting has developed a good body of ore, the breast at present being in 7 ft. of ore averaging 6% copper, carrying bornite and copper glance; this ore is being shipped to the Washoe smeltery as fast as mined.

Ophir—A contract for the machinery and the building of the new concentrator at this mine of the Butte Central Copper Co., has been awarded to the Colorado Iron Works, the contract stipu-

lating that the work shall be finished by June; the concentrator will have a capacity of 100 tons of ore per day. The company has advertised for bids for the construction of the concrete work. Ore shipments have been resumed at the mine, one car of ore per week being shipped to the Washoe smeltery.

Pilot—At the annual meeting, Jan. 11, the finances of the company were reported in good condition and sufficient to carry the development work now in progress, to what is believed will prove a producing basis. A station will be cut on the 900-ft. level and a crosscut driven to the vein which was cut on the 1300-ft. level.

Deer Lodge County

The preliminary survey of the part of extension of the Butte, Anaconda & Pacific R.R. between Silver Lake and Georgetown, has been completed and men are now engaged in clearing the right-of-way and grading.

Georgetown Gold Mining Co.—At a meeting of the stockholders in Anaconda, Jan. 15, it was voted to resume operations as soon as the snow is gone, and the following officers were elected: H. A. Conyne, president; Garry Nugent, vice-president; James Pringle, secretary and treasurer; Charles Bostrom, general manager, all being Anaconda men. The company owns the Duplex, Standard and Four Aces claims, situated near the Southern Cross and Oro Fino mines. A tunnel has been driven 140 ft. on the vein on the Duplex claim, and tunneling will be continued.

Jefferson County

Boston & Corbin—A vein of ore recently encountered in the 1200-ft. level crosscut, has been drifted on for 40 ft., opening an average of 2 ft. of good copper ore which improves as the drift continues. The management believes it to be the same vein as that opened on the 500- and 700-ft. levels.

Lincoln County

Hazel T.—Work has been resumed at the Shaughnessy Hill property by this company, and two shifts of men are driving the lower tunnel to cut the vein at an estimated depth of 300 ft. A tunnel was originally driven which cut the vein at a depth of 145 ft. and drifting was done both ways on the vein for a considerable distance, indicating that a good quality of silver-lead ore exists.

Sanders County

Montana Gold—At this property, owned by R. Martin and others, of Spokane, a strike of free-milling gold ore has been made. A crosscut tunnel was driven 275 ft. to the vein and a drift started at 130 ft.; the latter opened the oreshoot, which extends across the face of the drift.

Nevada

Comstock Lode

Union Consolidated—The new station at the 2500-ft. level of the joint Sierra Nevada winze has been completed, and recently a west crosscut was started, the object being to make connection on this level with the north drift from the Mexican workings, the latter being advanced along the course of the vein. The crosscut will be extended about 700 ft. before reaching the point of connection with the north drift, and will be farther east by several hundred feet than any Comstock workings in the deep levels. The progress downward of the winze has disclosed the fact that the country is well mineralized. When the connection is made all work in the Union will be accomplished through the winze, instead of through the Mexican.

Ophir—A southwest crosscut has been started from the end of the south drift from the west crosscut, and is being advanced through porphyry and quartz in a strong vein formation. This crosscut will open a large unexplored territory in the main Comstock vein. The ore recovery from the mine last week was about 400 tons, giving $14,000 gross assay value.

Ward—Blowers and air pipe are being installed on the 2000-ft. level at the Ward raise, where the old workings from the Bullion incline were broken into recently. Air will be forced ahead and the bulkhead holding the water in the Gold Hill mines tapped as soon as possible. The territory between the first and second bulkheads has already been drained.

Mexican—The mill is now running at one-half capacity on second-class ore, but the production will be increased as soon as a new classifier has been installed, the first one being insufficient to handle the pulp properly.

Con. Virginia—The southwest drift in the vein on the 2550-ft. level is in a mixture of clay and quartz stringers carrying low-grade ore. The vein is now much wider than the drift.

Savage—The stockholders' annual meeting at San Francisco on Jan. 8 elected H. L. Slosson, Jr., W. C. Ralston, C. B. Sessions, and reëlected A. F. Coffin and W. B. Bannon as directors. The directors elected Mr. Slosson, president; Mr. Ralston, vice-president; Whitman Symmes, superintendent, and Miss O'Neil, secretary. This places the Savage under the same control as the Mexican.

Nye County

Tonopah—The net profits for December amounted to $160,978 from 15,062 tons of ore milled, of an average value of $20.25 per ton. During the quarter ended Nov. 30, 1911, the gross value of the ore milled was $873,824; mining, milling and general expense, $430,312; net earnings, $443,511; miscellaneous income, $16,524; net income, $460,036; exploration, $12,587; dividend payable Jan. 20, $400,000; leaving $47,448, surplus for the quarter. The cash statement shows cash on hand, Nov. 30, as $705,097, and $1,651,669 as total quick assets.

Tonopah-Belmont—The net profits for December amounted to $151,137. The company milled 7490 tons and shipped 2330 tons to the smelteries. The main working shaft entered the Belmont vein recently at a depth of 1375 ft. and has now penetrated it for 20 ft. without striking the footwall. All of this ore is of shipping grade. A winze is also being sunk on the vein from the 1286-ft. level, 300 ft. east of the shaft, and is also in shipping ore.

MacNamara—The plant of 10 stamps and one tube mill, having a capacity of 50 tons per day, commenced operations last week.

Tonopah Extension—The company has announced that it will commence the payment of regular dividends soon. The mill is treating an average of 4400 tons per month, the net profits ranging from $15,000 to $18,000 per month. Sinking of a new 3-compartment shaft, 1250 ft. west of the present shaft, will soon start.

Mizpah Extension—The company has opened up at a depth of 1000 ft. what is believed to be the eastern extension of the Belmont companys' Little Belle vein. It is low-grade ore, 20 ft. wide, with a 12-in. streak averaging $66.90 per ton.

Big Four—The orebody in this mine at Manhattan is 44 ft. wide on the 400-ft. level, averaging, through the mill, $20.30 per ton. The mill is treating 55 tons per day.

White Caps—John Kirchen, manager of the Tonopah Extension mine, and Tonopah associates have purchased this lease in which a large tonnage of milling and shipping ore is exposed.

New Mexico

Grant County

Men reported to be representing Phelps-Dodge interests, arrived at Silver City recently and went from there to Leopold. It is stated by one of the officials that no immediate resumption of mining operations is contemplated.

Chloride Flat—A body of rich ore has been encountered in a drift from the main shaft.

Sierra County

Vanadium Mines Co.—On Jan. 22, at Pittsburg, Penn., W. A. Bonitz was appointed receiver for this company. The petitioner, Helen F. Bennet, alleged that the company has debts of $203,000. The company's mines are situated in this county, and the plant for the reduction of ferro-vanadium is at Rankin, Pennsylvania.

SOCORRO COUNTY

Ernestine—H. B. Hovland has confirmed the reports as to his option on this property and states that it covers a period of 90 days, about one-third of this having already expired. As yet no action has been taken under this option.

Tri-Bullion—Development work with day and night shift is being done at the Contact shaft, situated west of the Kelly mine, and at the Nit shaft, north of the Graphic mine. Both shafts are following drill holes.

South Dakota

BLACK HILLS DISTRICT

Columbus—Montreal men who have secured an option on this and the Hidden Fortune properties, have started energetically at a thorough examination. A. M. Howatt, of Salt Lake, is in charge of the work with a crew of technical men assisting. The Hidden Fortune shaft has been dewatered, and this and the surface workings are being sampled. The work of removing the water from the Columbus shaft is proceeding, although it is rather slow work on account of the large stopes which are filled with water. This shaft is 500 ft. deep, with most of the stoping on the 200 level and above. H. D. Whitehead, of Los Angeles, is in charge of the assay office.

Wasp No. 2—The management decided to suspend operations on Jan. 7 until weather conditions were more favorable for mining in the opencut. The shutdown is indefinite, but will probably not last longer than Apr. 1. During 1911 this mine produced $286,160 in gold bullion. Dividends to the amount of $60,000 were disbursed during this time, making the total dividends to date $291,965, or nearly 60% of the $500,000 capitalization.

Texas

A New York syndicate, headed by S. M. Swenson & Son, 37 Wall St., has acquired about 10,000 acres at the mouth of the Brazos River, and will develop the sulphur deposit on the Bryan Heights "dome."

Utah

BEAVER COUNTY

Beaver Combination—This property is in the Star district, between the Red Warrior and Moscow. The shaft has just been completed to the 100-ft. level, and a contract has been given to sink to the 300. A vein, 5 ft. thick in places, is being followed. It is proposed to install a new hoisting plant, and to push work as soon as the 200-ft. level is reached.

JUAB COUNTY

Tintic shipments for the week ended Jan. 12 amounted to 153 cars. The output is not yet back to normal, but railroad facilities are improving.

Sioux Consolidated—The financial statement for the last year has been issued. Receipts, including cash on hand, Jan. 1, 1911, were $160,654. Cash on hand, Dec. 31, 1911, amounted to $714. During the year, 7884 tons of ore were marketed, bringing $78,244. Three dividends of 4c. per share each, amounting to $89,446, were paid.

Colorado—Some good silver-lead ore has been found on the 300-ft. level of the No. 2 workings. Four or five feet of ore have been opened.

Beck Tunnel—Drifting has been started north from the 300-ft. level of the No. 2 shaft. This work is being done to prospect at depth below the iron blowout and croppings on the northern end of the property.

PIUTE COUNTY

Bully Boy & Webster—Breaking ground for the new 100-ton mill was started about Dec. 15, and it is planned to have the plant ready for work during the coming spring. The cost will be approximately $35,000. There is estimated to be about 60,000 tons of ore between the No. 1 and lower workings of the No. 2 tunnel, which runs as high as $10 in silver and gold, about $9 being in the latter metal.

SALT LAKE COUNTY

Bingham Mines—During the last fiscal year, this company is reported to have earned $80,000 net, after payment of all expenses, including interest on bonds. The earnings will be used to retire bonds to save interest charges during 1912.

Alta Tunnel & Transportation—This company was recently incorporated with 1,000,000 shares, par value 10c.; J. A. Eakins is president. It is expected that a tunnel will be driven from Silver Fork of Big Cottonwood to crosscut the vein system at Alta. If this is done, the important veins of the camp will be cut at a greater depth than yet reached.

Utah Mines Coalition—The stockholders have approved of turning over the company's assets to the Michigan-Utah company for 250,000 shares of the latter company's stock.

Utah Copper—The company's output for 1911 is estimated at 98,000,000 lb. The production in 1910 was 85,644,511 pounds.

SUMMIT COUNTY

Daly West—The loading station is reported to have been destroyed by fire on Jan. 20, entailing $15,000 loss with no insurance. Operations at the mine have been entirely suspended but the management hopes to resume soon.

UINTAH COUNTY

On Jan. 1 about 200 men made a rush for the Vernal oil fields to relocate claims on which the necessary assessment work had not been done.

Phosphate deposits were discovered about six months ago near the north rim of the Uintah Basin, about 16 miles north of Vernal. The deposits are reported to be about 25 ft. thick. The greater part of the phosphate area, except the southerly outcrop, is within the forest reserve.

Wisconsin

Quinlin—This mine, at Benton, which was profitable about 20 years ago, is being reopened with excellent indications.

Campbell Separating Co.—This company, at Cuba City, is adding five more electric separators to take care of its growing business.

Optimo—This mine, at Linden, will be equipped with a 200-ton electric separator.

Rowley—The new mill at this mine has been completed by the Vinegar Hill company, and mining will be resumed by the new owners, after a 4-year shutdown. The company will place a mill on the old Raisbeck mine, one of the oldest in the district.

Canada

ALBERTA

Canadian Western Natural Gas, Light, Heat & Power Co.—This company has been incorporated in Alberta with a paid-up capital of $8,000,000, par $100. The company has an agreement with the Canadian Pacific Railway Co., giving it the right to drill for natural gas over an area of 2425 square miles in southern Alberta. It already owns eight natural-gas wells, producing 68,000,000 cu.ft. per day, of which aggregate 65,000,000 are stated to be obtained from five wells having an average closed-in or rock pressure of 795 lb. per sq.in. Of the eight wells, one is at Bassano, one at Brooks, one at Dunmore Junction, and five at Bow Island, all being along the lines of the Canadian Pacific Railway.

ONTARIO

Good Luck—This claim, comprising 233 acres in Van Horne Township, Manitou Lake area, has been sold by A. McPhail and D. Hutchison, to a syndicate of London, Eng., represented by C. H. James. The price is said to be $75,000. A force of 20 men under Supt. C. H. Rogers has been put to work.

ONTARIO-COBALT

Ore shipments for the week ended Jan. 19 were as follows: McKinley-Darragh, 142,980 lb.; Coniagas, 109,080; Nipissing, 103,700; Buffalo, 61,360; total 417,120 lb. Bullion shipments were: Crown Reserve, $35,840, and $6500 from the Nova Scotia.

La Rose—A financial statement as of Jan. 2 shows: Cash in bank, ore in transit and at smelteries, $1,542,737; at mine

ready for shipment, $108,585, and $1,651,322 total.

Nipissing—The report that the company has acquired an option on the Tommy Burns property at Porcupine is denied by E. P. Earle, president. He states that he, personally, has an arrangement with certain men interested in the Porcupine property, whereby he can, if he so desires, make preliminary investigations and acquire certain stock interests. Snow on the ground prevents anything being done under this option until spring. A financial statement of the Nipissing company as of Jan. 2 shows: Cash, $1,014,309; ore in transit and at smelteries, $128,034; at mine ready for shipment, $291,428, making $1,433,771 total.

Green-Meehan—The purchaser of this mine is an American syndicate of Detroit and Buffalo men. Arrangements are being made for active development work and it is proposed to install a mill. It is stated that there is $75,000 worth of ore on the dump.

ONTARIO-PORCUPINE

Hollinger—A strong syndicate is reported to be negotiating for 200,000 shares of this stock. The long delayed Robbins report is to be issued in a few days.

Swastika—The Armstrong-McGibbon interests are stated to be negotiating for a large block of this stock.

North Dome—The new plant is completed and underground work is being started. President B. E. Cartwright, of the Temiskaming company operating this property, reports that a station is being cut at 50 ft., or 10 ft. above the bottom of the shaft, from which a crosscut will be run to test the vein. The shaft will be put down to the 100-ft. level, where a second station will be cut. The 6-drill compressor is supplying air for two underground drills.

Imperial—Drifting on the vein at the 100-ft. level is giving good results.

Flannigan-McLean—These claims are under option to Philadelphia men.

American Goldfields—An important new vein, which does not show on the surface, has been struck by the diamond drill on the 150-ft. level.

ONTARIO-SUDBURY

Canadian Copper Co.—The company is actively pushing development work at the Froude mine. The shaft is down over 100 ft. Poles for the power line from Copper Cliff are up, the wire is nearly all strung and the railroad spur is about one-half graded. This spur will cross the main line of the Canadian Pacific R.R. at a point about half-way between Sudbury and the Murry mine. The C. P. R.R. is also constructing a spur from this point to Copper Cliff, thus giving a better opportunity to handle freight from the higher level of its main line. The rock house at the Creighton mine of the company was recently destroyed by an explosion. The cause of the explosion is not known. One man only was in the building at the time and he was blown to atoms. The hospital was recently burned down entailing a $50,000 loss covered by insurance.

Morley-Caswell—This property at West Shining Tree has been taken over by the Duluth West Shining Tree Mining Co., capitalized at $300,000, the first company to enter this field. Ten men are at work and a diamond drill will soon be put in.

Mexico

MEXICO

Esperanza, Ltd.—During December, the mill crushed 21,385 tons of ore. Total receipts were $137,207; expenses, $108,661; profit, $28,456. During the month 1429 ft. of development were done.

SONORA

Greene-Cananea—Accompanying the announcement of the initial dividend of 25c. per share, payable Mar. 1, the estimated results for 1911 were issued as follows: Copper produced, 45,247,218 lb.; cost per lb., 9½c.; construction per lb., ⅝c.: total cost, 10⅛c.; net profit, $1,140,000, after deducting construction expenses. W. E. Corey has been elected a director succeeding James Hoatson.

TEPIC

The Southern Pacific R.R. was expected to be opened to traffic as far as the city of Tepic, on Jan. 15, establishing a direct connection between Los Angeles, Calif., via Nogales, Ariz., and the city of Tepic. This is a trip of about three days, and there is little doubt that this district will receive considerable attention in the future.

Zopilote—A. F. Flynt, an engineer from Minnesota, U. S. A., acquired this property under lease and option last May. The 20-stamp mill and the two ball mills were repaired and put in commission, a concentrator was installed and the old hypo-lixiviation plant was converted into a cyanide plant; milling and treatment commenced in August. Since then the plant has run without interruption, the property employing 200 men. The shipments vary from $10,000 to $15,000 per month, Mexican money. There are large reserves of low-grade ore in the mines, as the old company did not attempt to work any ore assaying less than one kilo of silver per ton. The ores from the Jabalina and Restauradora mines are being worked at present. Some high-grade ore running from 6 to 10 kg. of silver per ton is reported to have been struck in both these mines. There is a good waterpower near the property, which it is planned to take advantage of.

Tenamache—The mine is situated on the edge of the ground belonging to the Zopilote company, and is owned by an American company, controlled by Mr. Ramsdell, of Guadalajara, that has been doing development work for the last three years, opening up old Spanish workings. H. Hale is in charge. The metallic content is silver, and the mine is said to contain some high-grade ore. No mill is at the property, but a shipment is now being made ready, to be sent over the Southern Pacific R.R. to a Northern smeltery.

Purisima—This property is situated 60 km. north of the city of Tepic; it is owned by A. F. Flynt, who has been doing development work during the last five years. A steam hoist and crusher have lately been installed and additional cyanide tanks and a Wilfley concentrator are being erected at the mill, increasing the present capacity to 25 tons per day. No ore has been stoped, all the ore milled originating from the development work, which has paid the expenses of operating the property.

Central America

COSTA RICA

Aguacate—The 50-ton mill ran steadily during December, yielding a fair profit over all expenses. The cyanide plant is now under construction. Recent installations include a Morgan Smith turbine and auxiliary steam plant. A 6-months' supply of ore has been blocked out above the 500 level and development is being pushed. P. G. Spilsbury is general manager and the office of the company is at 55 Liberty St., New York.

South America

PERU

Sulphur of high purity has been found in the southern part of the country. The deposits are near a railroad to the coast, which will soon be extended to pass the place of discovery.

Africa

TRANSVAAL

A new diamond field is reported to have been found in the western part of the Transvaal. There has been a rush to the region.

Asia

CHOSEN

Oriental—During November, 26,654 tons of ore were crushed, yielding $132,100 gross and net $56,002. Operating expenses were $73,786 and $2312 were spent on development and improvements. The Kung San Dong 40-stamp mill and the East Candlestick 10-stamp mill were hung up, the former 16 and the latter 10 days because of labor shortage.

The Market Report

Current Prices of the Metals, Minerals, Coal and Mining Stocks

Coal Trade Review

New York, Jan. 24—The coal trade in the West is gradually settling down into shape as the special demand resulting from the extreme cold weather passes over. At the same time working conditions at the mines and on the transportation lines are improving, though there are still complaints of shortage of cars and of delays in railroad deliveries.

Very much the same conditions exist in the East, both in the anthracite and the bituminous trades. Special demand is decreasing, and deliveries are improving; so that trade is again approaching a normal basis.

The Mine Workers' convention at Indianapolis moves slowly. The tendency so far seems to be toward the adoption of a radical policy.

At a meeting held in Chicago, Jan. 16, at which were present representatives of the coal operators of Illinois, Indiana, Michigan, Wyoming, Montana, Iowa, Kansas, Missouri and Oklahoma, an organization known as the American Federation of Coal Operators was effected for the purpose of bringing about a peaceful solution of labor disputes. H. N. Taylor was chosen president; C. S. Keithe vice-president; Charles L. Scroggs secretary and treasurer. It will be noted that Ohio and Pennsylvania were not represented.

Coastwise shipments of coal by water from principal Atlantic ports, 11 months ended Nov. 30, long tons:

	Anthracite	Bituminous	Total
New York	13,182,089	9,725,655	22,907,744
Philadelphia	1,977,886	4,466,196	6,444,082
Baltimore	235,735	3,668,293	3,904,028
Newport News	.....	2,440,418	2,440,418
Norfolk	.....	4,214,834	4,214,834
Total	15,395,710	24,515,396	39,911,106
Total, 1910	14,519,457	23,725,523	38,244,980

Total increase in 1912 was 1,666,126 tons, or 4.4 per cent. New York includes all the harbor shipping points.

British Coal Exports—Exports of fuel from Great Britain year ended Dec. 31, long tons: Coal, 64,599,266; coke, 1,064,839; briquettes, 1,612,741; coal sent abroad for use of steamships in foreign trade, 19,264,189; total, 86,541,035 tons, an increase of 2,494,980 tons, or 3 per cent., over the previous year.

German Coal—Coal production of German Empire, 11 months ended Nov. 30: Coal, 147,309,185; brown coal, 67,081,079; total, 214,390,264 metric tons, an increase of 12,401,523 tons over last year. Coke made was 23,025,879 tons; coal briquettes, 4,577,103 tons; brown-coal briquettes, 15,492,564 tons.

Exports from Germany, 11 months ended Nov. 30, were 24,806,125 metric tons coal; 52,582 tons brown coal; 4,079,834 tons coke; 2,236,907 tons briquettes. Imports for the 11 months were 9,958,356 tons coal; 6,468,976 tons brown coal; 549,013 tons coke; 195,984 tons briquettes.

Iron Trade Review

New York, Jan. 24—The situation in the iron and steel markets shows no material change. A fair amount of new business is reported, though the buying is still much below the high level of the December spurt. Specifications on contracts are on a fair scale and most mills are in position to utilize a good part of their capacity and have no need to worry about new business for a month or so to come. Prices are gradually firming up and there have been actual advances in several lines. Rail orders are still coming in, though the rail mills are still in a position to take orders for 1912 rolling quite freely. This line is, perhaps, the most backward of all in finished steel.

In pig iron there are many small orders—and a few larger ones—for foundry and basic iron. Furnace activity shows some increase, but more among the steel works stacks than the merchant furnaces. Many of the latter are inclined to hesitate about blowing in, except on a basis of positive contracts.

There is talk about Lake ore prices for the coming season, but nothing positive has yet been done.

The contract for 15,353 tons of armorplate for the two new battleships has been divided into three nearly equal parts, and awarded to the Midvale, the Carnegie and the Bethlehem steel companies.

Southern producers have organized a movement to secure lower freight rates on pig iron from Alabama and Tennessee to points in the North and Northwest. The matter is to be taken up with the railroads first. Later on application may be made to the Interstate Commerce Commission, if necessary.

Negotiations have been going on among several Mahoning Valley blast-furnace interests with a view of consolidating and building a steel plant, and it seems now that this plan will go through. The Brier Hill Iron & Coal Co., operating Grace furnace, at Youngstown, with a capacity of 140,000 tons of pig iron per year; the Youngstown Steel Co., operating a blast furnace with a capacity of 100,000 tons per year, and the Thomas Steel Co., Niles, Ohio, operating sheet mills, propose to consolidate as the Brier Hill Steel Co., with a capital stock of $15,000,000, and to build an openhearth steel plant adjacent to the blast furnace of the Brier Hill company. It is possible, but not yet settled, that the Empire Iron & Steel Co. and the De Forest Sheet & Tin Plate Co., both operating sheet and tinplate mills at Niles, may be included. The new plant will have a capacity of probably 1000 tons of steel per day, which will be furnished in the form of billets, sheetbars and tinbars to sheet and tinplate mills in the district. The furnace companies mentioned have large ore and coal properties.

Baltimore

Jan. 22—Exports for the week included 112,309 lb. spelter, 88,740 lb. zinc dross and 2,270,900 lb. steel billets to Liverpool; 560,064 lb. pig lead to Hamburg. Imports included 20,835 ingots spelter from Antwerp; 1000 tons spiegeleisen and 500 tons manganese ore from Rotterdam; 4525 tons pyrites from Huelva, Spain; 17,400 tons iron ore from Cuba.

Birmingham, Ala.

Jan. 22—While much is still being said in the South about exports of pig iron and steel rails, there is a little business being transacted in the domestic trade. The iron prices are steadier with $10.25 per ton, No. 2 foundry, as the average quotation. There is very little $10 iron now being sold, as far as can be learned. Sales being made are for delivery during the second quarter of the year. The make is not being improved any nor is there any indication of any increased output this month. Furnace repairing has not been abandoned, but as long as there is a good quantity of iron in furnace and warrant yards and the make is almost equal to the outward movement, there will be no larger production.

Shipments of pig iron to Austria and to Hull, England, are announced in this territory, while a movement of 3300 tons of steel rails from the Tennessee Co.'s steel plant at Ensley, to Kobe, Japan, has been started on, the inspectors from that country being in this district now.

The order is for a new railroad being constructed in Japan and the rails are shipped by Savannah.

There will be a heavier melt at the cast-iron pipe plants in this section after Mar. 1, preparations being made to start up the big Dimmick pipe works, now property of the United States Foundry & Cast Iron Pipe Co. There is a little better condition noted also at the machine shops and foundries. The steel industry is looking up also.

Charcoal iron is still selling slowly, but with no reduction in the price, $22@22.50 per ton.

Chicago

Jan. 23—The iron market is quiet but firm, and there are no indications of weakness in the near future. There is a good demand for most lines of finished products, but pig iron does not strengthen. Southern No. 2 pig holds to $10, Birmingham, or $14.35, Chicago, despite efforts to lift it to at least $10.50; Northern No. 2 stays at $14 minimum, with local furnace men anxious to move it at that price. The temporary strengthening of a brief buying wave soon passes away in this market, for the melters of pig iron are not yet inclined to buy freely for deliveries several months ahead. Most of the orders now being booked are for second-quarter delivery; a few run into third quarter, and occasionally a melter will buy for the last half. The size of orders, however, is small; few are for more than 500 tons each. Lake Superior charcoal pig iron is quiet at $16 minimum.

In the finished-goods market there is a fair run of business in structural material, chiefly for buildings and bridges scattered throughout the western and southwestern territory, with a little business on railroad needs; prices run 1.30@1.35c., Chicago, for beams, etc. Railroad supplies are in increasing demand aside from rails, and some heavy rail requirements are still pending. The bar market shows increasing strength for local mills, as compared with Pittsburg, with very little tendency now to cut under Pittsburg prices, plus freight, and soft-steel bars selling at 1.25@1.33c., Chicago. Iron bars are selling fairly well at 1.15@1.20c. Plates are quiet at 1.30@1.35c., Chicago, and sheets are weak and ragged at 2.03@2.05c. General manufacturing conditions continue depressed, with little prospect of speedy recovery.

Cleveland

Jan. 22—Nothing more has been heard about ore prices for 1912, and there seems to be nothing doing yet.

Pig Iron—Sales continue good and inquiries frequent. Some large orders for basic have been placed. Prices have not advanced, but have a firmer tendency. No. 2 foundry is $13.25 and basic $13.40, Cleveland delivery.

Finished Material—Mills are doing pretty well. Some new orders are coming and specifications on contracts are quite liberal. Prices are generally firmer, except on plates, where there is still some shading.

Philadelphia

Jan. 24—The temporary activity in the pig-iron market, which raised expectations so high, has subsided and business for the past few days has been unimportant, excepting in a few cases where negotiations that have been pending for some time were brought to a close. The hardness of prices is being and probably will be maintained. The only interesting thing of the week was the slipping of some business to Virginia furnaces which was heading this way, but which was attracted southward by more favorable quotations. Some makers claim that as comparatively few buyers have covered their wants beyond 30 days, the present firmness will not only continue but that an advance of 25 cents can be safely expected. Actual consumptive requirements are on the increase. The better grades of No. 2 X foundry are approaching scarcity as to early deliveries. The quotations for second quarter are too high to induce foundrymen to order. Today's quotations are $15@15.25 for No. 2 X; $14@14.50 for forge; basic $14.25 nominally.

Steel Billets—Openhearth billets are not inquired for and no sales are heard of, but quotations are strong. Forging billets are held strongly at the advance with more liberal orders than usual.

Bars—The only change in the situation is that mill men are now soliciting business for any sort of forward delivery on the basis of present prices. Jobbers have placed liberal orders for probable requirements for the next two months.

Sheets—The strong tone of the sheet market is stimulating a good many buyers to extend their orders and the inquiries this week from a few large users of sheets point to an unusually large business this month.

Pipes and Tubes—A strong tone in the tube market is due to the contracting ahead of some large buyers.

Plates—The plate mills have more business on hand than for a long time. The smaller boiler shops throughout the East are picking up business.

Structural Material—There is enough pending business to give a strong tone to the market but just at present the orders are rather light. Large buyers are disposed to higgle over asking prices on business which can be safely postponed a few weeks.

Scrap—Dealers in scrap are making no effort to unload their large stocks and consumers are showing no disposition to purchase beyond immediate necessities.

Pittsburg

Jan. 26—The steel market continues quiet all along the line, no improvement having occurred in the past week. There is a fair volume of specifications against contracts for bars, plates, shapes, etc., in some cases close to the output, but usually falling below the output. The mills entered the year with a good aggregation of specifications, however, and continue to be in comfortable position.

The indifferent tone of the market in general has not had any material influence upon prices, which are quite well maintained. There is a little weakness in sheets at points, but on the other hand wire products have been advanced $1 a ton. It appears that the American Steel & Wire Co., the leading interest, contemplated making an advance, but that the Pittsburg Steel Co., one of the prominent independents, anticipated its action by a day, sending out notices Saturday night, while the leading interest sent out its notices Monday night. Superficially, the various independents immediately fall in line and advance their prices, but as a matter of fact it is understood that a number of them quietly make contracts at the old price with some of their favorite customers, not getting up to an advanced price absolutely until several days have elapsed. It is understood that some business of this sort is being done at this time, but for practical purposes the market may be quoted at the $1 a ton advance, as follows: Plain wire, 1.40c., base; wire nails, $1.60, base; painted barb wire, 1.60c.; galvanized barb wire, 1.90c. The previous advance, of $1 a ton, was made Dec. 11 last. The year 1911 opened with nails at $1.70, there being two advances early in the year to $1.80, after which the market declined a total of $6 a ton to $1.50, late in November. Barring the low prices late last year, the new $1.60 price is as low as any made since 1899, though it was touched twice, in 1904 and in 1909.

Pig Iron—The foundry-iron market is stiffer, a number of small lots having gone at $13.25, Valley, while formerly $13 could be done on both small and large lots. The Standard Sanitary Manufacturing Co. has purchased about 3000 tons of Northern iron for first-quarter delivery to its New Brighton and Allegheny plants, at $13, Valley, and has also bought about 2000 tons of Southern iron for its Louisville plant, at $10, Birmingham. Small lots of malleable iron have been sold at $13.10 and $13.25, Valley, marking a definite advance in this market, considering that the 1000-ton lot mentioned last week brought $13, Valley, when the market formerly was about $12.75. It is understood that the Pittsburg Steel Co. has bought between 10,000 and 15,000 tons of basic iron for February delivery, from the same interest from which it purchased a similar tonnage for

January. The price of $14.25, Valley, on bessemer iron has been cut lately by brokers, one selling 1000 tons to a foundry interest in this district at the reported price of $14.10, while 3000 tons was similarly sold to a steel casting interest at $14.20 or less. The furnaces continue to quote $14.25, and a sale of two carloads was made yesterday at this figure. We quote: No. 2 foundry, $13@13.25; malleable, $13@13.25; forge, $12.50@12.75; basic, $12.35@12.50; bessemer, $14.25, all f.o.b. Valley furnaces, 90c. higher delivered Pittsburg.

Ferromanganese—Sales are relatively light, but the market is well held at $41, Baltimore, for prompt or forward delivery.

Steel—Competition by mills west of Pittsburg has resulted in a slightly lower level for billets and sheet bars. It appears that the marking up process proceeded too rapidly, and prices today are about $1 a ton at Youngstown below the quotations of a week or two ago, although about $1 a ton higher than the lowest prices made recently. We quote bessemer billets at $19 and bessemer sheet bars at $20, f.o.b. Youngstown; bessemer and openhearth billets at $19.50@20; bessemer and openhearth sheet bars at $20.50@21 Pittsburg. The advance in wire products ostensibly carries with it an advance of $1 a ton in rods, making the nominal quotation $26, Pittsburg, but it is doubtful whether all producers will insist upon the $26 price on attractive orders, and we now quote the market at $25@26, Pittsburg.

Sheets—Specifications are coming in at a fair gait, but are hardly equal to current shipments, and there is very little new inquiry. Occasional reports are heard of shading, but in general prices are well maintained. The leading interest is quoting a higher level on corrugated roofing than some of the independents, based on a new list it issued about three weeks ago, showing a new arrangement of differentials between gages. Its prices on 28 gage corrugated are $1.35 for painted and $2.50 for galvanized. We quote: Blue annealed, 10 gage, 1.40c.; black, 28 gage, 1.90c.; galvanized, 2.90c.; painted corrugated, $1.30@1.35; galvanized corrugated, $2.47@2.50 per square.

St. Louis

Jan. 22—The market is just a little brighter on pig iron. A few more inquiries have been received and the volume of business contracted for this week has been a little larger. There is no doubt that the demand will increase considerably in the course of a few weeks, as weather conditions have been such since the holidays as to discourage buying. It is thought that in the next two months foundries will be buying quite freely for present needs and will also be inclined to put in a fair stock of iron to meet future requirements. The demand for cars and railroad supplies in general, as well as for other finished products, is quite encouraging. The price of $10.50 per ton, Birmingham, or $14.25, St. Louis, for No. 2 foundry is both the current and future quotation. There has been some business done in Northern iron, though the volume is not as great nor the price as strong as on Southern iron. Northern No. 2 is quoted at $14.50 @15 per ton, St. Louis.

METAL MARKETS

New York, Jan. 24—The metal markets are again inclined to be more quiet, though actual demand continues good and the tendency is to improvement.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal	Exports	Imports	Excess
Gold:			
Dec. 1911..	$ 994,677	$ 4,707,330	Exp. $ 3,712,653
" 1910..	1,330,400	4,976,632	Imp. 3,646,232
Year 1911..	37,183,074	57,445,184	Imp. 20,262,110
" 1910..	58,774,822	59,222,518	Imp. 447,696
Silver:			
Dec. 1911..	5,997,360	3,306,727	Exp. 2,690,633
" 1910..	6,061,060	4,398,450	Exp. 1,662,610
Year 1911..	65,664,646	43,746,571	Exp. 21,918,075
" 1910..	57,360,973	45,878,168	Exp. 11,482,805

Exports from the port of New York, week ended Jan. 20: Gold, $1076; silver, $1,236,000, chiefly to London. Imports: Gold, $151,315; silver, $95,562, from Mexico, Central and South America.

Gold—Prices on the open market in London were at the usual level, 77s. 9d. per oz. for bars, and 76s. 4d. per oz. for American coin. There was no special demand except a moderate one for India, and some shipments to South America.

Iridium—The market is steady and the price continues $64 per oz. for pure metal.

Platinum—Trade is rather quiet and prices are reported unchanged. Dealers ask $46 per oz. for refined platinum and $48.50 per oz. for hard metal.

Our Russian correspondent writes, under date of Jan. 10, that the market is dull and inactive. The position is a hesitating one, and dealers are quite uncertain as to which way it will turn; whether prices will advance or recede. Quotations are nominally unchanged, 10 rubles per zolotnik—$37.60 per oz.—being asked at Ekaterinburg for crude metal, 83 per cent. platinum; 38,500 rubles per pood—$37.73 per oz.—at St. Petersburg for the same grade.

SILVER AND STERLING EXCHANGE

Jan.	18	19	20	22	23	24
New York....	56¾	56⅞	57⅛	57⅜	57⅛	57⅜
London	26	26 3/16	26⅜	26⅜	26 5/16	26⅜
Sterling Ex.	4.8675	4.8695	4.8705	4.8710	4.8725	4.8710

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

Silver—Silver has advanced on speculative buying, based on reports that there has been a further reduction in the Indian currency reserve. No definite information on this point has reached this market. Meantime silver looks steady.

Exports of silver from London to the East, Jan. 1 to Jan. 11, reported by Messrs. Pixley & Abell:

	1911	1912	Changes
India.....	£ 163,500	£193,300	I. £ 29,800
China.....	86,000	80,000	D. 6,000
Total.....	£ 249,500	£273,300	I. £ 23,800

India Council bills in London averaged 16.09d. per rupee for the week.

Copper, Tin, Lead and Zinc

NEW YORK

Jan.	Copper: Lake, Cts. per lb.	Copper: Electrolytic, Cts. per lb.	Tin: Cts. per lb.	Lead: New York, Cts. per lb.	Lead: St. Louis, Cts. per lb.	Zinc: New York, Cts. per lb.	Zinc: St. Louis, Cts. per lb.
18	14.30 @14.50	14.10 @14.15	43	4.45	4.32½ @4.37½	6.40 @6.55	6.25 @6.40
19	14.30 @14.50	14.10 @14.15	42½	4.45	4.32½ @4.37½	6.40 @6.55	6.25 @6.40
20	14.30 @14.50	14.10 @14.15	42½	4.45	4.32½ @4.37½	6.40 @6.50	6.25 @6.35
22	14.30 @14.50	14.10 @14.15	42	4.45	4.32½ @4.37½	6.40 @6.50	6.25 @6.35
23	14.30 @14.50	14.10 @14.15	42	4.45	4.32½ @4.37½	6.40 @6.50	6.25 @6.35
24	14.30 @14.50	14.10 @14.15	43	4.45	4.32½ @4.37½	6.40 @6.50	6.25 @6.35

The quotations for copper, lead, spelter and tin are for wholesale contracts with consumers, without distinction as to deliveries; and are representative, as nearly as possible, of the bulk of the transactions, reduced to basis of New York, cash, except where St. Louis is specified as the basing point. The quotations for electrolytic copper are for cakes, ingots and wirebars. The prices of casting copper and of electrolytic cathodes are usually 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market; for good ordinary brands, both desilverized and non-desilverized; specially refined corroding lead commands a premium. The quotations on spelter are for ordinary Western brands; special brands command a premium.

LONDON

Jan.	Copper: Spot	Copper: 3 Mos	Copper: Best Sel'td	Tin: Spot	Tin: 3 Mos	Lead, Spanish	Zinc, Ordinaries
18	63	63¾	67¼	192	188¾	15 1/16	26¼
19	62 11/16	63 1/16	67¼	190¼	187¼	15 1/16	26¼
20	.....	.....	.....	.....	.....	.....	.....
22	62¾	63 1/16	67¼	189	187	15¾	26¼
23	62¾	63⅛	67	189¼	188	15¾	26¾
24	62 7/16	63 1/16	66¾	192	190½	15 11/16	26½

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17½c; £12 = 2.61c.; £23 = 5c.; £60 = 13.04c. ± £1 = ± 0.21¾c.

Copper—During the week of Jan. 18-24 the market has been extraordinarily

dull, the same general conditions prevailing as during the previous week. While some of the agencies continue to quote 14½c., delivered, usual terms, as their price asked for electrolytic, others have offered freely at 14⅜c., delivered, etc., and trade when any interest is manifested. The sales of the week have been light, the few reported having been at about 14.30, delivered, usual terms, corresponding to about 14.10@14.15, cash, New York, but sales by second hands are reported to have been made at lower figures. The market for Lake copper has been equally dull and nominal. One or two lots sold at 14.40. The situation is simply that consumers have well covered their immediate wants and at present are indisposed to anticipate their requirements at the present level of prices. Producers on the other hand are so well supplied with orders that they are not pressing their metal for sale. The market is quoted nominally at 14.30@14.50c. for Lake copper and 14.10@14.15c. for electrolytic in cakes, wirebars and ingots. Casting copper is quoted nominally at 13⅞@14 cents.

The standard market has been subject to constant selling pressure, in consequence of which the tendency is distinctly downward. The close is barely steady at £62 8s. 6d. for spot, and £63 3s. 9d. for three months.

Copper sheets are 19@20c. base, for large lots. Full extras are charged and higher prices for small quantities. Copper wire is 15¾c. base, carload lots at mill.

Copper exports from New York for the week were 7915 long tons. Our special correspondent gives the exports from Baltimore at 1390.

Brass Prices—The American Brass Co. announces the following new prices, taking effect Jan. 11: Sheets, high brass, 16c. net per lb.; low brass, 17⅝c. Wire, high brass, 15¾c.; low brass, 17⅝c. Rods, high brass, 15¾c.; low brass, 18⅜c. Brass tubing, brazed, 20¾c.; open-seam, 19⅜c. Brass angles and channels, 19½c. Scrap allowances are 10½c. net per lb. for high brass and 11⅝c. for low brass.

Tin—The London market did not develop any definite trend during the past week, being firm one day and weak the next. The bulk of the transactions took place in three-months tin, which was rather firmer in tone than spot material. The East does not seem to be an anxious seller at this time, as hardly any offers are forthcoming from there. The close is strong at £192 for spot, and £190 10s. for three months.

Inquiries in the domestic market were plentiful, but very little business took place. Spot tin is still scarce, but the premium which had risen to almost 1c. per lb. seems to be getting smaller. The quotation for January tin is about 43 cents.

The Netherlands Trading Society announces that the quantity of Banka tin to be sold in 1912 will be increased from 235,000 to 265,000 pikuls. The production of Billiton tin in 1911 was 73,538 pikuls, an increase of 4038 pikuls over the previous year.

Messrs. Robertson & Bense report the arrivals of tin ore at Hamburg, Germany, in December, at 1216 tons.

Tin output of Federated Malay States year ended Dec. 31 was 43,863 long tons in 1910, and 43,610 in 1911; decrease, 253 tons.

Receipts of Bolivian tin in Great Britain in 1911, as reported by Messrs. H. A. Watson & Co., Liverpool, included 29,676 tons of ore and concentrates and 464 tons bars; the whole equivalent to 18,269 tons metallic tin. Receipts in Europe for three years past, reduced to terms of fine tin, were, in long tons:

	1909	1910	1911
British ports	14,550	15,727	18,269
Havre	1,216	808	1,155
Hamburg	2,275	1,690	3,170
Total	18,041	18,225	22,594

The receipts in 1911 exceeded those of 1910 by 4369 tons, and those of 1909 by 4553 tons.

Lead—The market is unchanged at 4.45c., New York, and 4.32½@4.37½c., St. Louis.

The London market is easier and closes at £15 13s. 9d. for Spanish lead, and £15 16s. 3d. for English.

Spelter—The increase in activity that was noted last week has been well maintained and this week the transactions have amounted to a rather large tonnage, including February, March and April contracts. Occasional carloads of prompt metal have fetched a premium, but that is dwindling. The demand from consumers has been freely met by smelters. The market closes steady at 6.25@6.35c., St. Louis, and 6.40@6.50c., New York.

The London market is lower at £26 10s. for good ordinaries, and £26 15s. for specials.

Base price of zinc sheets is $8 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

Other Metals

Aluminum—Business continues steady and quotations hold at 19@19½c. per lb. for No. 1 ingots, New York. The foreign market is reported firm at about 12c. for ingots.

Antimony—Business has been rather quiet. Cookson's is again a shade lower, at 7⅜@7½c. per lb.; Hallett's is quoted the same, 7⅜@7½c. For Hungarian, Chinese and other outside brands, 6¾@7c. per lb. is named.

Quicksilver—Business continues on a fair scale. The New York quotation is $43 per flask of 75 lb., with the usual advances for small quantities. San Francisco, $42.50 per flask for domestic business and $40 for export. London price is £8 per flask with £7 17s. 6d. quoted from second hands.

Magnesium—The price of pure metal is $1.50 per lb. for 100-lb. lots, f.o.b. New York.

Nickel—Large lots, contract business, 40@45c. per lb. Retail spot from 50c. for 500-lb. lots up to 55c. for 200-lb. lots. The price of electrolytic is 5c. higher.

Zinc and Lead Ore Markets

Joplin, Mo., Jan. 20—The high price for zinc sulphide ore is $50 per ton, the base per ton of 60 per cent. zinc at $45 @47 per ton. Zinc silicate sold at $24 @27 per ton of 40 per cent. zinc. The average price, all grades of zinc, is $45.40. The high price for lead ore is placed by one purchasing agency at $60 and by another at $62.50 per ton. The average price, all grades of lead, is $59.58 per ton.

SHIPMENTS, WEEK ENDED JAN. 20

	Blende	Calamine	Lead Ore	Value
Webb City-Carterville	3,676,860	....	758,120	$105,471
Joplin	1,608,530	.....	77,930	39,330
Galena	491,820	.....	183,580	16,570
Alba-Neck	658,360	.....	.....	15,471
Carl Junction	562,490	.....	.....	14,060
Oronogo	383,480	.....	70,860	11,948
Duenweg	462,630	.....	49,750	11,901
Carthage	388,160	.....	.....	8,733
Granby	337,280	.....	10,780	6,450
Springfield	199,930	.....	.....	4,750
Stott City	203,000	.....	.....	4,466
Wentworth	124,890	.....	.....	2,746
Spurgeon	87,630	.....	30,040	2,635
Saginaw	....	88,890	11,610	1,675
Lawton	65,620	.....	.....	1,510
Quapaw	60,690	.....	.....	1,335
Jackson	48,680	.....	.....	1,070
Badger	35,830	.....	4,680	915
Totals	9,394,880	88,890	1,197,350	$251,036
3 weeks	24,391,200	517,180	3,327,960	$649,857
Blende val., the week, $214,032; 3 weeks,				$540,200
Calamine, the week, 1,333; 3 weeks,				7,515
Lead value, the week, 35,671; 3 weeks,				99,142

MONTHLY AVERAGE PRICES

Month	Zinc Ore: Base Price		Zinc Ore: All Ores		Lead Ore: All Ores	
	1911	1912	1911	1912	1911	1912
January	$41.85	.....	$40.55	.....	$55.68	.....
February	40.21	....	39.16	.....	54.46	.....
March	39.85	.....	38.45	.....	54.57	.....
April	38.88	.....	37.47	.....	56.37	.....
May	38.25	.....	36.79	.....	55.21	.....
June	40.50	.....	38.18	.....	56.49	.....
July	40.75	.....	38.36	.....	58.81	.....
August	42.50	.....	41.28	.....	60.74	.....
September	42.63	.....	41.29	.....	59.33	.....
October	42.38	.....	40.89	.....	54.72	.....
November	45.40	.....	43.25	.....	57.19	.....
December	44.13	.....	40.76	.....	62.03	.....
Year	$41.45	.....	$39.90	.....	$56.76	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

With practically all competition wiped out among the various local lead smelteries, through some purchase or agreement, it is the local smelters against the St. Louis Smelting & Refining Co. While the Webb City smelter is ostensibly owned by the American Metal Co. and the Galena smelter by the Hammer Paint Co., there are those here who profess to believe that the Picher Lead Co. has enough stock in each to have a voice in its business policy.

Other Ore Markets

Tungsten Ore—Ferberite, wolframite and huebnerite ores, $6.50@7 per unit per ton of 2000 lb. of ore containing 60 per cent. of tungsten trioxide. For scheelite ore, 50c.@$1.50 per unit less.

Zinc Ores—For Rocky Mountain blende of good quality, especially as to iron and lead contents, the current price is for the zinc contents, less eight units at the St. Louis price for spelter; with a deduction of $16 to $18 per 2000 lb. of ore; sellers to deliver ore at smeltery. Penalties may be charged for detrimental impurities. Blende is readily obtainable at Joplin on the basis of 87 per cent. of the zinc content at St. Louis quotation, less $16 for treatment, and less penalties for iron and lime.

Chemicals

New York, Jan. 24—The general trade is still rather quiet, but is feeling the effects of the contract season.

Copper Sulphate—A stronger demand is reported and a good business is doing. Quotations are unchanged at $4.90 per 100 lb. for carload lots, and $5.15 per 100 lb. for smaller parcels.

Arsenic—The market is stronger and prices are firmer, $2.50@2.62½ per 100 lb. being asked for white arsenic.

Sulphur—Reports from Texas are that a syndicate has acquired 10,000 acres of land on the Brazos River near its mouth, on which sulphur deposits are known to exist. The plans include active working of the deposits, the construction of a town and a shipping port. M. Swenson & Sons, of New York, represent the syndicate; among its members are John Hays Hammond and A. Chester Beattie.

Nitrate of Soda—Business is still inclined to be quiet. Spot nitrate is still 2.20c. per lb.; while 2.20c. is asked for futures up to July 1, and 2.17½c. for deliveries after that date.

Petroleum

The summary prepared by the *Oil City Derrick* gives the number of new wells completed in 1911 as follows: New York and Pennsylvania, 2008; West Virginia, 1192; Southeastern Ohio, 1197; Lima field, 527; Indiana, 117; Kentucky and Tennessee, 1365; Kansas, 417; Oklahoma, 4032; Louisiana and Texas, 327; total, 11,869, or 1714 less than in 1910. Besides the oil producers, there were 1116 new gas wells, and 1192 dry holes.

Mining Stocks

New York, Jan. 24—On Jan. 18 the Stock Exchange was decidedly dull and uninteresting. On the Curb there were large dealings in Inspiration Copper at a slight advance. Butte Coalition was active at a decline. Porcupine shares were in fair demand.

On Jan. 19 trading on the Exchange was more active and prices showed some tendency upward. Amalgamated Copper and Steel common both made advances. On the Curb there was some activity in coppers, notably Inspiration and Greene-Cananea. Other mining stocks were quiet.

On Jan. 20 there were sharp advances on the Exchange, nearly all of the prominent stocks gaining on an active market. Mining stocks on the Curb were more active and stronger, though the Curb did not fully come up to the Exchange rises.

On Jan. 22 the Exchange continued strong and active. United States Steel common held its own well, notwithstanding the proposed tariff reductions. There was one sale of Homestake at $89.50 per share. On the Curb the copper stocks were active, Inspiration, Greene-Cananea and Giroux selling freely at only fractional changes.

On Jan. 23 the Exchange was quiet and rather dull, on light business, though prices were well maintained. The Curb dealt rather freely in copper shares at small advances. Cobalt and Porcupine stocks were in favor and held their own in price.

Today conditions on the Exchange are about the same; quiet but rather firm. The Curb is still buying copper shares at slowly advancing prices. Only moderate trading in other mining stocks.

Boston, Jan. 23—This week interest has centered in the Lake Superior issues, notably Old Colony and Mayflower, through the recent rich drill strike in the latter mine. Both of the above mentioned stocks are at a slightly higher level than a week ago. Further favorable developments are expected from these properties, which tends to keep the stocks in the limelight. As a matter of fact, most of the activity has been in the lesser mining securities, which does not tend to give the market as healthy an appearance as is desired.

Greene Cananea has shown renewed activity on the resumption of dividends, and is up to $9 per share. The last 25c. dividend is made possible by the resumption of dividends by its subsidiary companies. The advent of former President Corey, of the Steel Corporation, into the Greene Cananea directory is also reckoned as a favorable factor.

Chino and Hancock have also been in the foreground in this market, both showing advances. Inspiration is also looked upon favorably. These convertible bonds are quoted 109@112, and the rights to subscribe to these bonds are 75c. bid.

COPPER PRODUCTION REPORTS.

Copper contents of blister copper, in pounds.

Company	October	Nov.	Dec.
Alaska shipments.	2,704,802	1,274,655	4,995,008
Anaconda	21,400,000	20,850,000	.....
Arizona, Ltd.	2,720,000	2,960,000	3,100,000
Balaklala	.....	.....	.....
Copper Queen	7,786,218	6,946,775	.....
Calumet & Ariz.	4,784,000	4,390,000	4,486.000
Detroit	2,086,624	1,941,498	.....
East Butte	920,000	983,405	.....
Mammoth	1,865,846	1,793,181	1,721,404
Miami	.....	.....	2,500,000
Nevada Con.	*5,547,931	5,207,983	4,679,674
Old Dominion	2,050,000	2,082,000	2,610,000
Ray	2,069,287	2,517,000	2,660,000
Shannon	1,124,000	1,256,000	.....
South Utah	326,578	361,681	267,514
United Verde*	2,750,000	2,500,000	2,000,000
Utah Copper Co.	8,660,729	9,117,961	9,039,557
Lake Superior*	18,440,000	18,600,000	17,500,000
Non-rep. mines*	13,564,713	11,483,000	.....
Total production.	98,800,728	94,265,139	.....
Imports, bars, etc.	22,960,027	17,224,725	.....
Total blister	121,760,755	111,489,864	.....
Imp. in ore & matte	4,137,431	4,767,217	.....
Total	125,898,186	116,257,081	.....
Brit. Col. Cos.:			
British Col. Copper	778,586	.....	.....
Granby	.....	.....	.....
Mexican Cos.:			
Boleo	1,245,440	.....	2,645,640
Cananea	5,804,000	.....	3,706,000
Moctezuma	1,719,643	1,682,768	.....
Other Foreign:			
Cape Cop., S. Africa	.....	857,920	.....
Spassky, Russia	672,000	685,440	.....
Famatina, Argen.	.....	174,720	.....
Exports from:			
Chile	4,816,000	4,704,000	5,824,000
Australia	7,056,000	7,168.000	11,200,000

Figures are reports received from companies, unless otherwise stated. Boleo copper does not come to American refiners.
*Estimated.

STATISTICS OF COPPER.

Month	United States Product'n	Deliveries, Domestic	Deliveries for Export
Year 1910	1,452,122,120	749,426,542	722,431,494
I, 1911	115,696,591	42,078,557	53,208,739
II	109,828,297	50,518,998	45,111,019
III	130,532,080	66,080,789	59,081,127
IV	118,085,223	52,407,650	62,129,599
V	126,962,544	64,543,963	61,978,557
VI	124,554,312	61,655,561	71,460,519
VII	112,167,934	56,982,582	74,880,658
VIII	125,493,667	59,935,364	69,855,660
IX	115,588,950	57,311,584	50,824,011
X	118,255,442	64,068,307	60,084,349
XI	111,876,601	68,039,776	67,049,279
XII	122,896,697	65,988,474	79,238,716
Year, 1911	1,431,938,338	709,611,605	754,902,233

	VISIBLE STOCKS		
	United States	Europe	Total
I, 1911	122,030,195	236,629,120	358,649,378
II	142,439,490	236,992,000	379,431,134
III	156,637,770	233,385,600	390,023,009
IV	162,007,934	223,014,400	385,022,434
V	165,555,908	212,284,800	377,840,708
VI	165,995,932	202,540,800	368,536,732
VII	157,434,164	195,932,800	353,366,964
VIII	137,738,858	191,891,840	329,630,698
IX	133,441,501	191,228,800	324,670,301
X	140,894,856	191,945,600	332,840,456
XI	134,997,642	176,825,600	311,823,242
XII	111,785,188	164,281,600	276,066,788
I, 1912	89,454,695	158,323,200	247,777,895

Figures are in pounds of fine copper. U. S. production includes all copper refined in this country, both from domestic and imported material. Visible stocks are those reported on the first day of each month, as brought over from the preceding month. From Jan. 1, 1911, stocks at Hamburg and Rotterdam are included in the visible stocks for Europe.

Curb trading has been of fair proportions, with especial activity and strength in First National and a few others. Ohio Copper, Rhode Island Coal and United Verde Extension developed pronounced weakness.

Assessments

Company	Delinq	Sale	Amt
Algomah, Mich	Jan. 22		$1.00
Alta, Nev	Jan. 26	Feb. 16	0.05
Andes, Nev	Feb. 7	Feb. 28	0.05
Black Jack, Utah	Feb. 6		0.01
Boston Ely, Nev	Jan. 18		0.50
Bruns. C. V. M., Nev	Jan. 12	Feb. 2	0.02
Bullion, Nev	Jan. 12	Jan. 29	0.05
Chollar, Nev	Jan. 3	Jan. 26	0.10
Confidence, Nev	Jan. 16	Feb. 6	0.20
Con. Imperial, Nev	Jan. 16	Feb. 7	0.01
Crown Point, Utah	Feb. 15	Mar. 11	0.005
Exchequer, Nev	Feb. 14	Mar. 6	0.05
Federal Ely, Nev	Jan. 5	Jan. 27	0.01
Gold Springs, Nev	Jan. 17	Feb. 3	0.04
Gould & Curry, Nev	Jan. 24	Feb. 13	0.05
Hancock Con., Mich	Jan. 10		1.00
King David, Utah	Feb. 13	Mar. 6	0.005
Ojibway, Mich	Jan. 10		1.00
Raven, Mont	Feb. 1		0.10
Savage, Nev	Feb. 14	Mar. 7	0.10
Seven Troughs Mon., Nev	Jan. 10	Jan. 31	0.002½
Sierra Nevada, Nev	Jan. 23	Feb. 13	0.10
Southwestern Miami, Ariz	Jan. 15		1.00
Spider, Utah	Jan. 15	Feb. 15	0.002½
Swansea Con., Utah	Jan. 17	Feb. 8	0.015
Tintic Standard, Utah	Jan. 8	Feb. 5	0.00
Utah, Nev	Jan. 19	Feb. 9	0.05
Yellow Jacket, Nev	Jan. 31	Mar. 6	0.10

Monthly Average Prices of Metals

SILVER

Month	New York			London		
	1910	1911	1912	1910	1911	1912
January	52.375	53.795		24.154	24.865	
February	51.534	52.222		23.794	24.081	
March	51.454	52.745		23.690	24.324	
April	53.221	53.325		24.483	24.595	
May	53.870	53.308		24.797	24.583	
June	53.462	53.043		24.651	24.486	
July	54.150	52.630		25.034	24.286	
August	52.912	52.171		24.428	24.082	
September	53.295	52.440		24.567	24.209	
October	55.490	53.340		25.596	24.594	
November	55.635	55.719		25.680	25.649	
December	54.428	54.905		25.160	25.349	
Year	53.486	53.304		24.670	24.592	

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

COPPER

Month	New York: Electrolytic		New York: Lake		London, Standard	
	1911	1912	1911	1912	1911	1912
January	12.295		12.680		55.600	
February	12.256		12.611		54.974	
March	12.139		12.447		54.704	
April	12.019		12.275		54.034	
May	11.989		12.214		54.313	
June	12.385		12.611		56.365	
July	12.463		12.720		56.673	
August	12.405		12.634		56.266	
September	12.201		12.508		55.253	
October	12.189		12.370		55.170	
November	12.616		12.769		57.253	
December	13.552		13.768		62.068	
Year	12.376		12.634		55.973	

New York, cents per pound, London, pounds sterling per long ton of standard copper.

TIN AT NEW YORK

Month	1911	1912	Month	1911	1912
January	41.255		July	42.400	
February	41 614		August	43 319	
March	40.157		September	39 755	
April	42 185		October	41.185	
May	43.115		November	43.125	
June	44.606		December	44.655	
			Av. Year	42.281	

Prices are in cents per pound.

LEAD

Month	New York		St. Louis		London	
	1911	1912	1911	1912	1911	1912
January	4.483		4.334		13.009	
February	4.440		4.266		13.043	
March	4.394		4.238		13.122	
April	4.412		4.262		12.889	
May	4.373		4.223		12.984	
June	4.435		4.292		13.260	
July	4.499		4.397		13.530	
August	4.500		4.406		14.260	
September	4.485		4.356		14.744	
October	4.265		4.139		15.332	
November	4.298		4.181		15.821	
December	4.450		4.332		15.648	
Year	4.420		4.286		13.970	

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month	New York		St. Louis		London	
	1911	1912	1911	1912	1911	1912
January	5.452		5.302		23.887	
February	5.518		5.368		23.276	
March	5.563		5.413		23.016	
April	5.399		5.249		23.743	
May	5.348		5.198		24.375	
June	5.520		5.370		24.612	
July	5.695		5.545		25.006	
August	5.953		5.803		26.801	
September	5.869		5.719		27.750	
October	6.102		5.951		27.256	
November	6.380		6.223		26.795	
December	6.301		6.151		26.849	
Year	5.758		5.608		25.281	

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PIG IRON AT PITTSBURG

	Bessemer		Basic		No. 2 Foundry	
	1911	1912	1911	1912	1911	1912
January	$15.90		$14.40		$14.75	
February	15.90		14.50		14.81	
March	15.90		14.65		14.96	
April	15.90		14.65		15.00	
May	15.90		14.30		14.72	
June	15.90		14.06		14.56	
July	15.90		14.03		14.53	
August	15.90		14.00		14.47	
September	15.90		13.57		14.40	
October	15.43		13.44		14.34	
November	14.92		13.30		14.25	
December	15.15		13.10		13.90	
Year	$15.72		$13.94		$14.49	

STOCK QUOTATIONS

COLO. SPRINGS Jan. 23

Name of Comp.	Bid.
Acacia	.04⅜
Cripple Cr'k Con.	.02⅛
C. K. & N.	.14
Doctor Jack Pot.	.06¼
Elkton Con	.64¾
El Paso	.75
Findlay	.05
Gold Dollar	.17
Gold Sovereign	.02½
Isabella	.15⅜
Jack Pot	.05½
Jennie Sample	.06
Lexington	.01
Moon Anchor	.01⅜
Old Gold	.02½
Mary McKinney	.46
Pharmacist	.02½
Portland	.93
Vindicator	.68
Work	.02½

SALT LAKE Jan. 23

Name of Comp.	Bid.
Beck Tunnel	.13
Black Jack	.10½
Carisa	‡.17
Cedar Talisman	.02¾
Colorado Mining	.31
Columbus Con	.20
Daly-Judge	‡5.20
Grand Central	.70
Iron Blossom	1.00
Little Bell	.40
Lower Mammoth	.02⅝
Mason Valley	11.25
May Day	.15½
Nevada Hills	2.15
New York	‡.07
Prince Con	.80
Silver King Coal'n	1.65
Sioux Con	.11½
Uncle Sam	.25
Yankee	‡.24

TORONTO Jan. 23

Name of Comp.	Bid	Name of Comp.	Bid
Coniagas	6.75	Pearl Lake	.10
Hudson Bay	75.00	Porcu. Gold	.45
Temiskaming	.34	Porcu. Tisdale	.03
Wettlaufer-Lor.	.80	Preston E. D.	.06
Apex	.06	West Dome	.37
Central	3.62½	Standard	.08
Dobie	.62	Foley O'Brien	.25
Dome Exten	.32	Rea	1.30
Hollinger	13.00	Crown Chartered	.14
Imperial	.05	Swastika	.10

SAN FRANCISCO Jan. 23

Name of Comp.	Clg.	Name of Comp.	Bid
COMSTOCK STOCKS		MISC. NEV. & CAL.	
Alta	.01	Belmont	8.30
Belcher	.48	Jim Butler	.36
Best & Belcher	.13	MacNamara	.26
Caledonia	1.40	Midway	.20
Challenge Con	.13	Mont.-Tonopah	1.02½
Chollar	.16	North Star	.29
Confidence	.65	West End Con	.82
Con. Virginia	.76	Atlanta	.17
Crown Point	.48	Booth	.06
Gould & Curry	.08	C.O.D. Con	.14
Hale & Norcross	.17	Comb. Frac	.13
Mexican	4.50	Jumbo Extension	.21
Occidental	.50	Pitts.-Silver Peak	1.31½
Ophir	1.45	Silver Pick	.06
Overman	1.25	St. Ives	.30
Potosi	.08	Tramps Con	.02
Savage	.13	Argonaut	2.50
Sierra Nevada	.37	Bunker Hill	‡3.00
Union Con	1.22½	Cent. Eureka	.36
Yellow Jacket	.40	So. Eureka	‡6.00

N. Y. EXCH. Jan. 23

Name of Comp.	Clg.
Amalgamated	64¾
Am. Agri. Chem	61⅛
Am.Sm.&Ref.,com	72⅛
Am. Sm.& Ref., pf.	103½
Am. Sm. Sec., pf. B	87
Anaconda	35⅜
Batopilas Min	1⅛
BethlehemSteelpf	61⅛
Chino	26¾
Federal M.& S., pf.	37⅛
Goldfield Con	4⅛
Great Nor., ore ctf.	41¾
Homestake	88
Miami Copper	24⅜
Nat'nalLead,com.	54
National Lead, pf.	106⅞
Nev. Consol	19¾
Pittsburg Coal, pf.	80½
Ray Con	17⅛
Republic I&S,com	26¼
Republic I & S, pf.	85½
SlossSheffi'd,com.	41
Sloss Sheffield, pf.	108¼
Tennessee Copper	37½
Utah Copper	55⅞
U. S. Steel, com	66½
U. S. Steel, pf	111½
Va. Car. Chem	55½

N. Y. CURB Jan. 23

Name of Comp.	Clg.
Barnes King	‡.35
Beaver Con	.42
Braden Copper	5⅝
B. C. Copper	4⅜
Buffalo Mines	1¼
Butte & Vipond	.53
Butte Coalition	22½
Cobalt Central	‡.01
Con. Ariz Sm	¼
Davis-Daly	⅞
Diam'field-Daisy	13
Ely Con	½
Florence	.60
Giroux	4⅝
Gold Hill Con	
Greene Cananea	9
Greenwater	.06
Guggen. Exp	‡180
Inspiration	10⅝
Internat. S. & R.	‡124
Kerr Lake	2⅛
La Rose	3¾
McKinley-Dar-Sa.	1⅜
Min. Co. of A. new	4
Nev. Utah M. & S.	⅛
Nipissing Mines	6⅞
Ohio Copper	⅞
Pacific Sm. & M.	⅜
Porcupine T'nsite	03½
Precious Metals	‡1⅜
Ray Central	1⅜
Red Warrior	‡1½
South Utah M. & S.	⅛
Standard Oil (Old)	625
Stand'd Oil of N.J.	369
Stand'd Oil Subs.	325
Stewart	1
Tonopah	7⅝
Tonopah Ex	1½
Tri-Bullion	⅜
Tularosa	⅜
Yukon Gold	3 7/16

LONDON Jan. 24

Name of Com.	Clg.
Camp Bird	£1 12s 9d
Dolores	1 10 0
El Oro	0 16 9
Esperanza	2 12 6
Mexico Mines	7 5 0
Oroville	0 5 3
Stratton'sInd.	0 3 1½
Tomboy	1 2 6

BOSTON EXCH. Jan. 23

Name of Comp.	Clg.
Adventure	6
Algomah	6 7/16
Allouez	42½
Am. Zinc	25⅛
Ariz. Com., ctfs.	3⅛
Bonanza	.45
Boston & Corbin	8⅛
Butte & Balak	3¾
Calumet & Ariz	61
Calumet & Hecla	430
Centennial	20⅛
Con. Mercur	.05
Copper Range	53⅛
Daly West	5
East Butte	13
Franklin	11¾
Granby	37
Hancock	34½
Hedley Gold	15⅝
Helvetia	1¾
Indiana	13
Island Cr'k, com.	41½
Isle Royale	21½
Keweenaw	1⅞
Lake	36
La Salle	5½
Live Oak	42½
Mass	8
Michigan	3⅛
Mohawk	55
New Arcadian	4
New Idria Quick	7⅝
North Butte	25½
North Lake	5⅝
Ojibway	6
Old Dominion	46½
Osceola	108
Parrot	‡13¼
Quincy	76½
Shannon	10¼
Shattuck-Ariz	18
Superior	27
Superior & Bost.	4⅛
Tamarack	31
Trinity	6¼
Tuolumne	3½
U. S. Smelting	35
U. S. Smelt'g, pf.	47¾
Utah Apex	3
Utah Con	16⅛
Victoria	5
Winona	5¾
Wolverine	97½
Wyandot	2¼

BOSTON CURB Jan. 23

Name of Comp.	Last
Ahmeek	240
Bingham Mines	2½
Boston Ely	1 5/16
Boswyocolo	.10
Cactus	.16
Calaveras	2
Chief Cons	85
Corbin	3
Cortez	1½
Crown Reserve	2⅞
First Nat. Cop	2⅞
Majestic	.44
Mazatan	1
Moneta Porc	.14
Nevada-Douglas	2⅞
New Baltic	4
Oneco	2⅞
Raven Copper	.24
Rhode Island Coal	.34
San Antonio	‡3½
South Lake	6½
Trethewey	‡.55
Union Mines	‡½
United Verde Ext.	.65
Vulture	‡5½

‡Last quotation.